

COOP'S TECHNOLOGY DIGEST

-A Timely Report On The World Of Communications-

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APRIL 26, 1994 / ISSUE 94-04-08

-IN THIS ISSUE-

SATELLITE LINKING- A VIABLE ALTERNATIVE?

COMPETITION-p.2; **RADIO** Network-p.3; **CIRCUIT** Costs-p.4; **GRADES** Of Service-p.7;

CALCULATING Service Levels-p.10; **AGREEMENT** Terms-p.13; **GETTING** Started-p.15;

OPERATING Your Own Uplink?-p.16; **MINI-TERMINALS** (VSAT)-p.18;

AUSTRALIA APPROVES 'ANOTHER' FORM OF PAY-TV

COAXIAL Cable Analogue Service-p.20; **67 CHANNELS** On Lease-p.21;

CTS- Who's Behind It?-p.22; **WHAT** Programming?-p.23

TECHNOLOGY BYTES / INDUSTRY NEWS UPDATES

PanAmSat Sept Start-p.25; **INTELSAT** Updates-p.26; **MURDOCH** Kicks BBC Off-p.28; **INTELSAT** Video

Update-p.28; **UK SKY** Piracy Steps Up Notch-p.28; **OLYMPIC HDTV** Dashed?-p.31; **BATTERIES** Will Reshape Electronics?-p.32; **BLUE** Laser Breakthrough-p.32; **GREYMOUTH** Cable Fights TV3-p.35; **SKY NET** Security At Risk?-p.36; **PRIVATE VHF TV** Licences/UHF Booster Licences Before Williamson-p.37; **NZ SKY**

NET Growth Update-p.38; **FEBRUARY** Electronic Imports-p.38; **COLLEGE TV-FM** Start-p.39

SUBSCRIPTION Form-p.40

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COOP'S TECHNOLOGY DIGEST

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SATELLITE LINKING - A VIABLE ALTERNATIVE?

While BCL and partner Clear Communications are spending \$40,000,000 to complete a new North Island fibre optic cable link, and hundreds of broadband, high speed fibre optic or microwave route miles already exist within New Zealand, there is at least the suspicion of some that satellite linking between locations within New Zealand could be cost effective.

Satellite linking, between two fixed locations, moved from big time to mass time in the mid 1980s. Two factors drive this ongoing revolution which in some portions of Europe, North and South America has literally rewritten the rule book for point to point communications. The first and most important factor is the availability of satellites. Not just any satellites, but satellites planned for use by relatively small (often called VSAT) style terminals. If you have the satellite(s) in place, then the second factor in the equation is the availability of low cost, reliable, simplistic (to install and operate) VSAT electronics.

Most people entering the strange, new world of satellites are introduced to the realm through the television services available via satellite. One quickly learns that if a satellite is of adequate power, a simplistic, low in cost RO (receive only) 'terminal' (dish antenna plus electronics) will produce quality service. If you lived in a country where your daily drive to work took you past dozens of .5m roof or wall mounted TVRO (television receive only) dish antennas, it would be but a matter of time before you began to consider how these small, simplistic antennas might be useful in your business; whatever that business might be.

But an RO may only receive satellite signals. If your work involves two-way communication the conversion from receive-only to transmit and receive might, you suspect, be more of a complication. How do you get from receive only to transmit and receive such that the dish antenna installed on a building you have chosen carries on a two-way dialogue with another similar dish system some distance away? Is it expensive? Is it complicated?

THE COMPETITION

Firms providing terrestrial linking services to the exclusion of satellite linking are not sources for information nor guidance. Why should they help you learn about, possibly even consider replacing one of their terrestrial circuits with a satellite circuit? Will the BMW dealer tell you all about the fine features of the Jaguar? Of course not.

Until this year, 1994, in New Zealand the only potential user categories of satellite have been the two TV networks (TV3, TVNZ including SKY) and Telecom + Clear. This is because, first, the amount of satellite capacity available for New Zealand has been very limited, and, second, the only firms willing to pay the costs involved have been those firms who have had no alternate means of doing what a satellite relay can do for them. But, with the addition in 1994 and 1995 and 1996 of more than a dozen new satellites with the capability of serving New Zealand (see CTD 9311, 9312) all of the rules change. Examples of alternate use of a satellite, and the savings follow.

Because New Zealand's business community is relatively small, it is difficult to describe a proposed system without providing clues to the reader as to the potential user of the system. We put you on notice that we are disguising as best we can relevant numbers in our examples primarily to protect the confidence granted CTD by those who have shared information. A very clever person still might figure out the potential user of our examples.

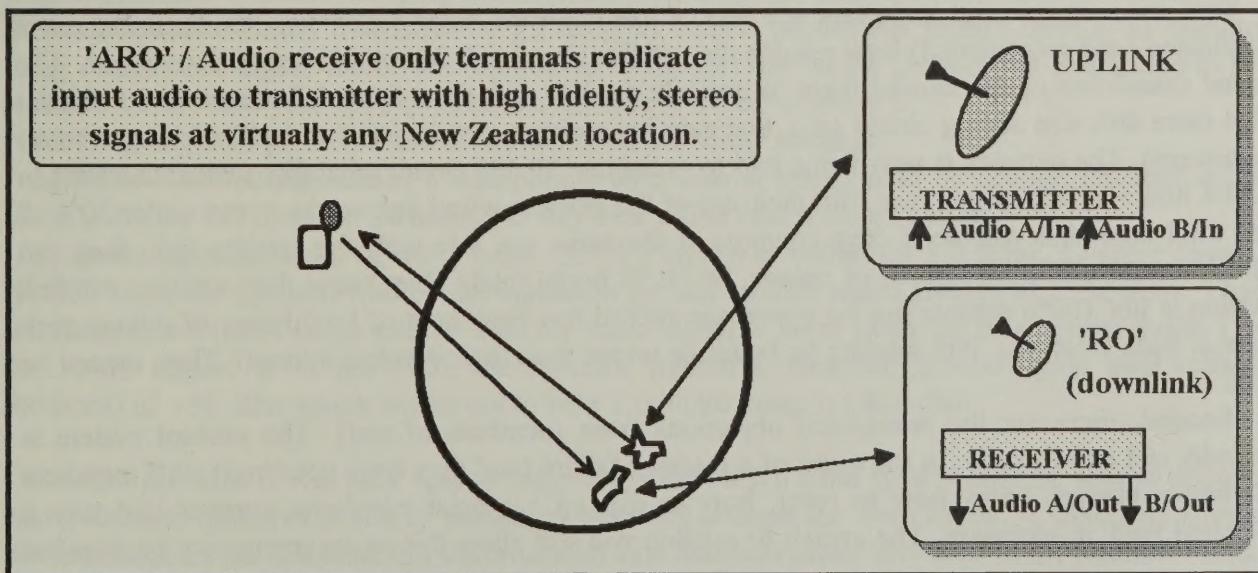
#1) A RADIO NETWORK: This company must feed news and feature material to approximately 40 (not real number) affiliate stations scattered throughout New Zealand. The material being fed is one-way (from the central production studio to each station; some of which operate in an automated mode without personnel always in attendance).

This company now pays just over \$1,100,000 per year to a terrestrial wireline company (that shouldn't be too difficult to narrow down!) for the full-time interconnections.

In hand is a bid from two satellite operators. Satellite operator 'A' will provide a full-time 50 kilohertz bandwidth audio channel on a Ku band (12 GHz range) satellite for an annual cost of \$91,000 including uplinking the bandwidth to its satellite via an established (Telecom; there's no hiding this one) uplink.

Satellite operator 'B' will provide the same bandwidth and will provide the user with its own uplink terminal for a combined annual fee of \$127,000. In this case the uplink system is on a lease-purchase arrangement although the radio network operator will be responsible for routine maintenance.

Our radio network operator has studied the cost of equipping each of the 40 radio station sites with a suitable satellite antenna and receiver system. At first pass it came to just over \$400,000 or



\$10,000 per station location. This was using a New Zealand company with good engineering credentials but no real experience in the satellite field as the supplier of the 'RO' terminals. A second pass now underway suggests the costs per RO can be reduced to under \$7,000 per location by employing an offshore firm that routinely does this for its livelihood. The terminals will consist of 2 metre range dish antennas, frequency-compensated (i.e., special stability circuits) receivers that end up with two audio-output jacks in 600 ohms. One jack is for the stereo network feed (we are not suggesting the radio network is presently stereo; only that it could be with this system), the second is an 'intercom' line that will provide a 'cue channel'; between the radio network headquarters and the affiliate stations. In this way individual stations can be told precisely when to expect certain programme feeds, and be given a countdown for feeds about to begin.

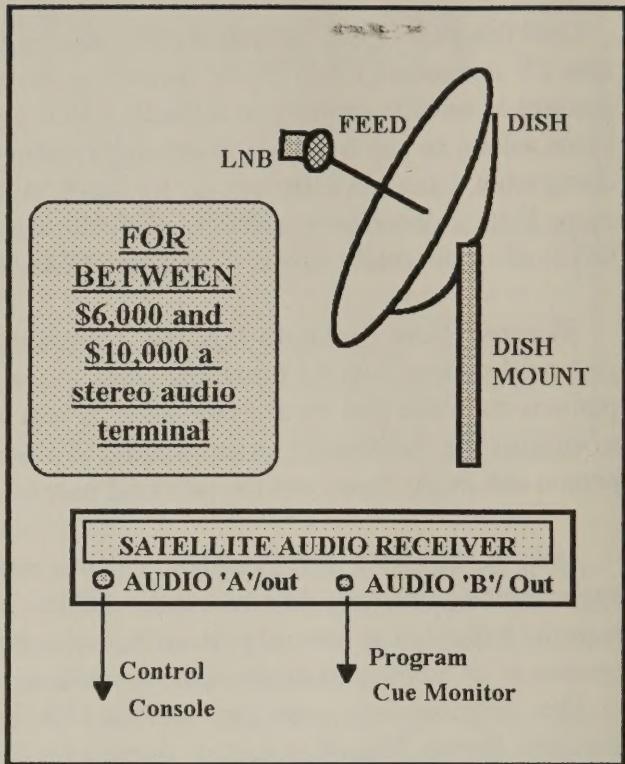
Even a first-year accounting major could determine that our example network would save \$573,000 in the first year (\$1,569.86 per day) if it selected the most expensive satellite operator ('B') and the most expensive receiver package (\$400,000 range). And in the second and successive years - an annual saving of \$973,000.

BRINGING DOWN CIRCUIT COSTS

Seemingly, saving \$973,000 per year from a present expense of \$1,100,000 per year would be a short decision cycle. But our example network is hesitating. Why?

First and perhaps most important is a fear of this unknown thing called satellite. Engineers have calculated (and recalculated) how reliable the satellite signal will be even in heavy downpours. The initial calculation of this caused them to upgrade the RO dish sizes from 1.2 metres to 2.1 metres (the extra dish size adding circuit gain, that gain becoming a new 'margin' or buffer during a heavy rainstorm). The network is now being told to anticipate 99.6% circuit reliability which translates to 35.04 hours of outage per year. But their use of the existing wired link works out to under 30% of the total time in a year so if they continue at the same use rate with the satellite link, they can anticipate 30% of 35.04 hours of outage, or 10.51 hours total. They know their existing wirelink system is not 100% reliable but no systematic record has been kept of total hours of outage each year at each location. Will satellite be better or worse than their wirelink system? They cannot be sure.

Second, there are the anticipated objections from members of staff. The present system is friendly and comfortable. In the event of a massive failure (and they have occurred) staff members at remote stations know how to react, how to dial up a special telephone number and take a 'patched feed' if necessary. The switch to satellite will still allow this as an emergency backup but



	ANNUAL LINK COSTS	OUTAGE TIME/HRS P/YR	NEW CAPITAL COSTS	ESTIMATE ANNUAL MAINTEN.	YR ONE REF. WIRELINE	5 YR REF. WIRELINE
WIRELINE	\$1,100,000	unknown	none	none	-XX-	-XX-
SAT 'B'	\$127,000	35.04 hrs	\$400,000	\$10,000	+ \$563,000	+ \$4,415,000

**RADIO NETWORK COMPARISON of satellite linking versus existing nation-wide
wireline linking system**

there will be a period of adjustment. The wireline link is (virtually) always there whenever the remote staffers hit the network button. Will it be via satellite?

Third, there is the possible reaction from the wireline company. Will they come back with a new rate, one more 'bottom line friendly?' They won't be happy, of course. And there is political clout of sorts. Will the wireline company attempt to force them to stay with terrestrial service by putting pressure on them?

#2) This one is more hypothetical since we only have two TV network groups at present and no amount of number fiddling would disguise the actual interested party. Suffice to say there is a real party exploring this but the numbers have been converted such that we end up with a hypothetical rather than a real example.

Here's the situation. Network 'Z' has a central TV production facility and it feeds programming out to most of North and South Island. The feeds go by four separate transmission systems; a few via fibre optic lines, a few go via short hauls of Telecom microwave, more go via hops of BCL microwave and finally the network's primary city stations transmit through the air and are picked up for retransmission on new TV channels. The cost of all of this is in excess of \$2,400,000 per year.

Three satellite operators were approached on this proposal, none knew the exact identity of the project operator. Because the proposed system would not go into operation until 1995, the TV network had determined that it would go from its central production facility directly to satellite using compressed digital video. The equipment to support this on the ground was anticipated to be available before mid-year 1995 (it is not economically available today).

All three satellite operators were asked to bid on the same package:

a) a 9 MHz wide segment of a transponder (the normal transponder or satellite 'channel' is 36 MHz wide) for full-time use 24 hours per day over a five year contract period.

b) the transponder could be on 'C band' (3.7-4.2 GHz) or within the Ku band (12 GHz range). If on C band, the operator wanted the minimum ground satellite signal level to be + 32 dBw. That translates to a 4 metre range satellite dish for video signal to noise (measure of received quality) in the 50 dB region. If on Ku band, the operator wanted a minimum ground signal level (called footprint) of +36 dBw which works out to be a 1.6 metre range satellite dish.

Satellite operator C was only able to suggest pricing on Ku band (you should be able to deduce why). Satellite operators A and B submitted proposed charges for both bands. A table here shows the raw numbers for Ku-band but unfortunately raw numbers mean very little in the satellite world.

Recall that individual satellites are designed for specific purposes. As one example, the Russian satellites carry only a few 'channels' (36 MHz wide transponders), 5 is typical, but each transponder is very powerful. So powerful that even at C band where normally larger antennas are required for the ground segment, antennas as small as 0.5 to 1 metre are possible.

Most satellite designers take a different approach. They have two options: fewer transponders but each with more power, or, more transponders each with lesser power. In the satellite business a transponder is like a seat on a bus. The bus has a maximum number of seats and for each seat filled with a paying customer there is revenue. Most satellite operators (like the economy section of aeroplanes) try to cram as many seats as possible into a fixed space. The 'space' is the total bandwidth allowed for the satellite.

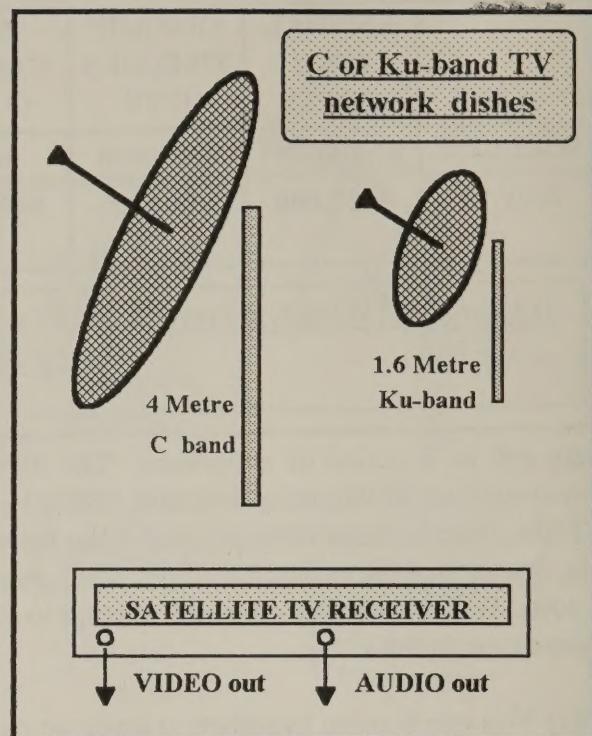
The convention is to design transponders so they are 36 MHz wide; each 36 MHz is a 'seat.' This number was chosen because it happens to fit the maximum needs of a satellite passenger (user) who wishes to transmit an analogue, full motion broadcast quality TV programme through the satellite. By conventional design, each transponder on board a satellite has its own unique circuitry within the system. CNN, for example, using one transponder can diddle with that transponder all it wishes (even in error) and the worst harm that CNN can do is to screw up its own service.

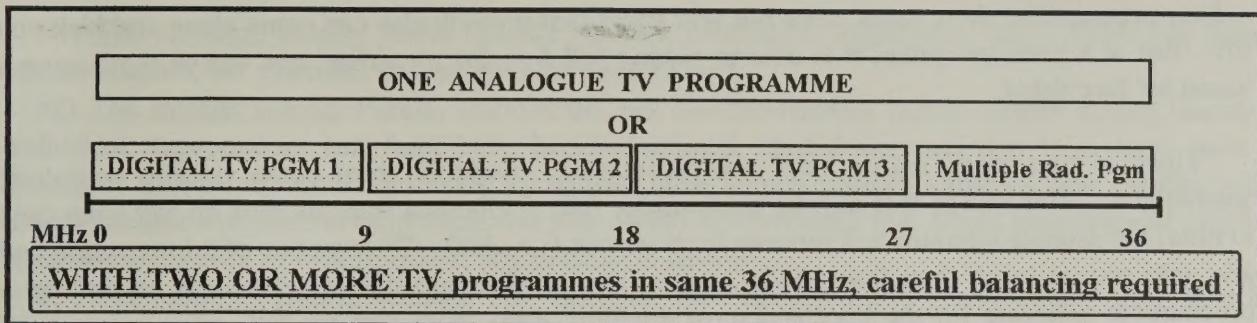
Alas, with compressed digital video a 36 MHz wide transponder can accommodate from four upwards (to at least as many as 20) totally separate TV programmes simultaneously. If four TV programmers share a single transponder, the 36 MHz of transponder space is divided into 9 MHz each ($9 \times 4 = 36$). Now, if one of the four does something in error, it is likely the other three users of the same transponder will be affected.

The analogy is to place four very small children into a bus seat in lieu of one sizeable adult. One of the children pees in his or her pants and the entire seat is affected.

If someone like Ted Turner rents a 36 MHz wide transponder and then chooses to divide that 36 MHz up such that CNN, CNN Headline News, TNT and the Cartoon Channel all share the space, that leaves Turner's people totally responsible for the full transponder. But, if TV3 rented 9 MHz of one transponder, and was joined by TV1 (9 MHz), TV2 (9 MHz) and the last 9 MHz was split up between Maori Radio, Horizons Pacific and a TAB radio channel ... well, you can imagine the degree of co-operation required to ensure that one of these 'peeing in their pants' doesn't mess up the transponder for everyone 'on board.'

This scenario is of considerable concern to any satellite operator who leases out less than full (36 MHz wide) transponder space to two or more users. Under all contracts, the lessor is responsible for controlling his uplink (earth to satellite) signal to standards established by the satellite operator. That seems straight forward enough. But experience has shown that when two unrelated entities





share a transponder the satellite operator must devote a considerable amount of extra engineering-monitoring time to the satellite transponder to ensure it is being properly used. This extra time costs extra money and the satellite operators usually loathe being 'policemen' of their clients.

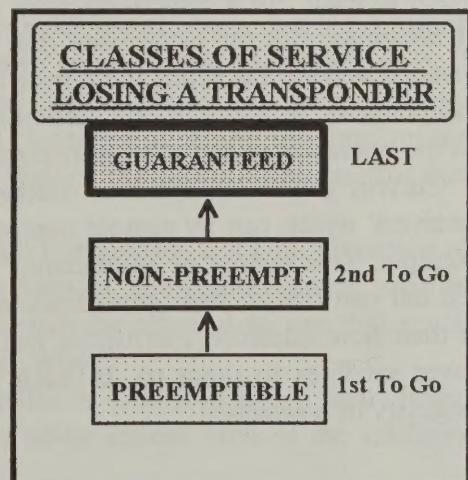
Any partial-transponder user will face this problem. He will be charged more for (say) 25% of a transponder than the full cost divided by 4; there will be special rules that will translate to special monitoring equipment at the uplink (earth to satellite transmitter) site. That's the first 'special consideration' our hypothetical user encountered. Our 'Radio Network' operator in the first example faces this same problem.

HERE TODAY - GONE TOMORROW

Intelsat offers 'grades of service' although on the surface they seem quite similar. A user is interested in how much satellite signal will be available (which translates to the size and cost of his RO terminals), how much it will cost, and whether the satellite operator will 'guarantee' the availability of the satellite. This is where the grading occurs. And with 'grading' comes price differentials.

The first two-grades you will encounter are "preemptible" and "non-preemptible." The first costs less than the second. Both may well have the same bandwidth and the same power density (signal level) on the ground. But the preemptible space is available first of all to you but only as long as no other user is willing to take the same space on a non-preemptible basis.

Think of preemptible as an economy airline seat bought on special offer at a savings. Many airlines offer a portion of their total seats on an under utilised route at bargain fares but with conditions: you must book and pay for the ticket a month or more in advance, there is no refund should you not fly. A preemptible satellite spot is much the same way: your rate is a fraction (typically 73%) of the non-preemptible rate, and with short notice you may be told to either move (to a new transponder) or if none is available, to simply quit operating. Preemptible has dangers but on a lightly occupied satellite users are sometimes able to negotiate a preemptible contract that allows them to convert to non-preemptible. In this situation as a preemptible user you pay very close attention to the way the other transponders on the bird are filling up, and when they reach a dangerously full point, you consider exercising your option for non-preemptible.



Non-preemptible, then, costs more but you know that nobody else can come along and kick you off. But at a premium price; it is akin to paying full fare for an airline seat versus purchasing a 'stand by' fare ticket.

There is one 'class' higher than non-preemptible, available from some satellite operators; 'guaranteed.' This means that if your transponder fails (individual transponders do fail from time to time) the satellite operator will remove from service (i.e., kick-off) someone of a lower class and give you service using their transponder space. The satellite operator is most likely to pick on a preemptible customer for the boot and most satellites, even those that are full, retain a couple of preemptible spots for just the eventuality. From the satellite operator's point of view, keeping a couple of preemptible spots in the mix is a way of collecting more money from guaranteed customers rather than simply setting aside (as in not using at all) a spare transponder or two. In the event of a complete satellite failure (Canada's ANIK E2 was struck by unusual radiation from the sun in January and went berserk in orbit; all users on board were without service; CTD 9402, p.32)), those with 'guaranteed' bookings will be first to be relocated to a backup satellite. Of course for some period of time (it was two days to a week in Canada) the services that had been using the defective satellite went without service. And before the new backup satellite could be used each of the ground terminals pointing at the defective satellite had to be physically reoriented to point at the backup satellite. The operators of satellites quietly maintain agreements with even their competitors (such as between PanAmSat and Intelsat) such that in the event of a complete satellite failure, each has a call on available transponder space on the other. In Canada's case, occupants of ANIK E2 were first moved to a nearby US operated satellite and then some were moved to a spare Canadian satellite.

Through all of this those services in preemptible and non-preemptible classes of service were left without a satellite relay; some permanently so.

As you can imagine each satellite operator makes certain claims for the superiority and redundancy (backup on board spare equipment) of their satellite. The failure of Anik E2 was quite unusual (in all of the prior years of satellite service only one other non-Russian satellite ever suddenly became totally unusable). The failure of a transponder or two (or three), over time or on short notice is not so uncommon.

Recall that within each satellite each satellite transponder (channel) is a miniature electronic world to itself. All transponders have a common housing, a common power supply, a common set of antennas. But the electronics (the receive system that catches the earth originated uplink, the transmit system that sends the power boosted signal back to earth) for each transponder are largely independent. A failure of one section (such as the transmitter) for one channel has no direct impact on the operation of the other transponders on board.

Current generation satellites routinely build into each satellite 'switchable spares,' a few 'spare receivers' which can by remote command from earth 'switch in' to replace one that goes bad, for example. This 'spares' or 'redundancy' of design is the stuff that makes great sales pitches. Intelsat will tell you first of their near-flawless performance record, second of the spares and redundancy of their new satellites. PanAmSat will do the same, although with a much shorter history and far fewer satellites to point to. In each case there are three factors that will ultimately affect the longevity of a satellite.

#1) The satellite's design. Some satellite builders have more experience, do a better job, than others. Hughes, for example, has an enviable track record.

#2) The satellite launch. Funny, unexpected, not satellite-friendly things happen during launch. Individual transponders can (and have been) damaged, shared-antennas can (and have been) damaged. Satellite operators generally try to hide such launch problems fearful their satellite will have a tarnished reputation (and users will stay away) if word leaks out. Users have learned to pay close attention even to wild rumours; where there is smoke

#3) The satellite's station keeping. No, satellites once launched into geostationary orbit do not stay in place by themselves. Minute variations in the earth's gravitational field, radiation pushing against the satellite from the sun and unknown 'quirks' all add up to something called 'drift.' To maintain a satellite within its assigned 'box' (typically a cube that is approximately 70 miles on a side) ground controllers 'fly' the satellite by remote control. Instruments on board the satellite send data (telemetry) constantly to ground and this data translates on a flight controller display terminal to the precise location, attitude, and condition of the satellite at all times. When satellites are actually 'flown' (moved on command from earth) miniature thruster rockets located around the satellite are 'fired' in millisecond bursts. An inert gas, stored in cylinders, shoots out of a nozzle. On earth it would be similar to the propellant power from an aerosol can. Nearly 36,000 kilometres in space, the 'force' of this few-thousandth-of-a-second burst actually drives the two ton satellite in the chosen direction.

In real time, more than 250 separate 'points' on and within the satellite are remotely monitored. The state of battery charge, temperature at various points on board, operating voltages, performance of each transponder ... nothing is left to chance.

How well a satellite is 'flown' is very important to its longevity and daily performance. Each satellite operator maintains their own flight control centre. Some, indisputably, do a better job than others.

#4) The satellite's operating limits. A subset of station keeping are the operational parameters allowed for each transponder on each satellite. All satellites have a finite life; each satellite operator makes claims concerning the expected lifetime of their 'bird.' The skill and quality of parts going into the original design and construction are an element of longevity. Equally so, the limits placed on each section of the satellite play a part in longevity.

When the sound from your stereo is uncomfortably loud, you can turn down the volume. When telemetering data from a satellite suggests one transponder is using too much power, transmitting with excessive power, it is first the responsibility of the transponder user to 'turn down' his uplink power (the more you send to the satellite, from ground, the more you get back; to a limit point). If the uplink operator fails to respond to a communiqué from the flight controller (i.e., does not turn his uplink power down), the flight controller can send his own command changing the 'limit' on the transponder internally. This in turn causes the transponder to 'reduce the power' (volume) for that transponder.

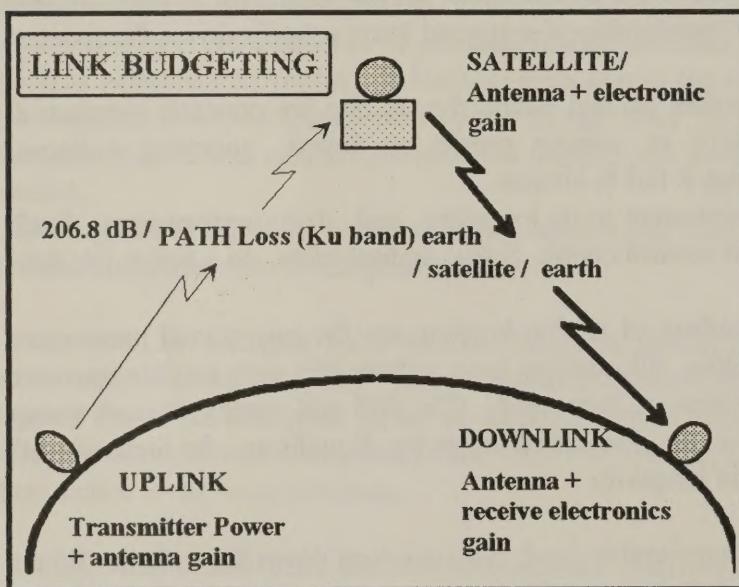
The lifetime of the critical TWTA/output power stage on each transponder is a direct function of the power level of the transponder. A transponder rated at 64 watts of (downlink) power, such as the PanAmSat PAS-2 for the Pacific, will seldom if ever actually be allowed to use that much power. Rather, limits half or less are placed on the transponder. Why?

Everything about a satellite is a study in conservatism. A satellite in orbit is akin to a finely tuned race car on earth; run at half speed. The theory is that if you never exceed 50% of the satellite's rated capabilities it will run longer without problems.

PRE-CALCULATING SERVICE LEVELS

Intelsat routinely adjusts the transmitting power of its individual transponders to suit the needs of the paying customer, up to the point of operating the satellite 50% derated. When you as a potential customer go to Intelsat (or PanAmSat or Optus) for a quotation, the first set of calculations done is called the 'link budget.' A proposed system of users that is willing to increase the size of their RO terminals, for example, as a trade off to the satellite operating at reduced power, is preferable to a customer who tries to insist that their ROs will operate with the smallest possible receive antenna size.

Everything about the satellite system is a trade-off. The most important trade off is on the ground at the RO terminals. If you are willing to double the size of your RO antennas, the satellite can cut its transponder power for your system by 3 dB; that's a 50% reduction in operating power. By reducing the operating power the satellite operator is exercising his conservatism and probably extending the life of his satellite. In most instances you are not buying a transponder, you are renting/leasing it for a finite period of time. From the satellite operator's viewpoint the less actual use (i.e., the lower power you require) while using it, the longer he can continue to use that transponder after you no longer require it.



A link budget is an arm wrestling exercise between the satellite operator's engineering department and the user's engineer(s). It comes down to 'how much more money are you, the user, willing to spend on your RO terminals (i.e., by making the RO terminal antennas larger)' versus 'how much power is the satellite operator willing to give to you during your lease?'

Of course antenna size is not the only factor in link budgeting. The amount of bandwidth you require (lesser bandwidths can lead to optimised RO performance with smaller antennas), the quality of service you are willing to accept

(television relay requires far greater signal levels for satisfactory performance than say a 50 kilohertz wide audio channel), and the sensitivity of your receive-only electronics all play a part in the link budget.

So negotiation with a satellite operator rapidly becomes far more complex than simply price alone since the price you receive could be substantially modified if you are willing to assume some of the link-budget responsibility. At this level of negotiation there is no substitute for bringing in someone on your side who understands these parameters and can calculate how your own system performance and RO costs will change as the satellite operator changes his proposed 'service levels.'

MISLEADING QUOTATIONS

Satellite transponder negotiations can be extremely competitive. With only Intelsat offering service to the Pacific Ocean Region, it has been difficult to do much negotiating when they knew

you couldn't obtain a second bid elsewhere. With the limited availability of Australian Optus (for New Zealand coverage), and the newly available (late 1994) PanAmSat PAS-2 satellite, the competitive nature of satellite offerings changes; rapidly.

Satellite operators are not beyond practising a bit of competitive price warfare. They are constantly 'testing' one another to determine how low the market price might be. With the wide range of service levels possible (preemptible, non-preemptible, guaranteed plus the power level and bandwidth variations) at least one of our earlier price-example bid-seekers ran into this in a most unexpected manner.

Our 9 MHz bandwidth television service provider had a preference for Ku band service; the antennas are physically smaller leading to greater ease in selecting on-ground sites for the hardware. As the table on page 5 here shows, they secured a bid of US\$514,687.50 (US dollar bidding is the tradition since it is considered the 'hard currency' of the satellite world) for a preemptible 9 MHz transponder slice.

In the course of negotiating with PanAmSat for the same capacity there was confusion; the 'best price' PanAmSat could offer was in the region of US\$900,000 per annum. In a business field where Intelsat is virtually never the 'low bidder' (and certainly not by a factor of 1.75 to 1) this sent our bid-seeker back to Intelsat. Could their price be in error? The first answer was 'no,' the price was correct.

But there was 'fine print' buried in the Intelsat bid offering. Intelsat was quite ready to stand by their price provided (quoting Intelsat):

#1) "(the user accepts) Intelsat policy that Ku-band beam pointing be governed by the number of transponders being leased on that beam, i.e., a single or combined guaranteed reservation will only be approved if the request is for 100% utilisation of the Ku-band spot beam."

#2) "(the user accepts that even if) "the utilisation is at least 50%, Intelsat shall have the prerogative to re-point the beam in any manner that will accommodate other requirements in the region."

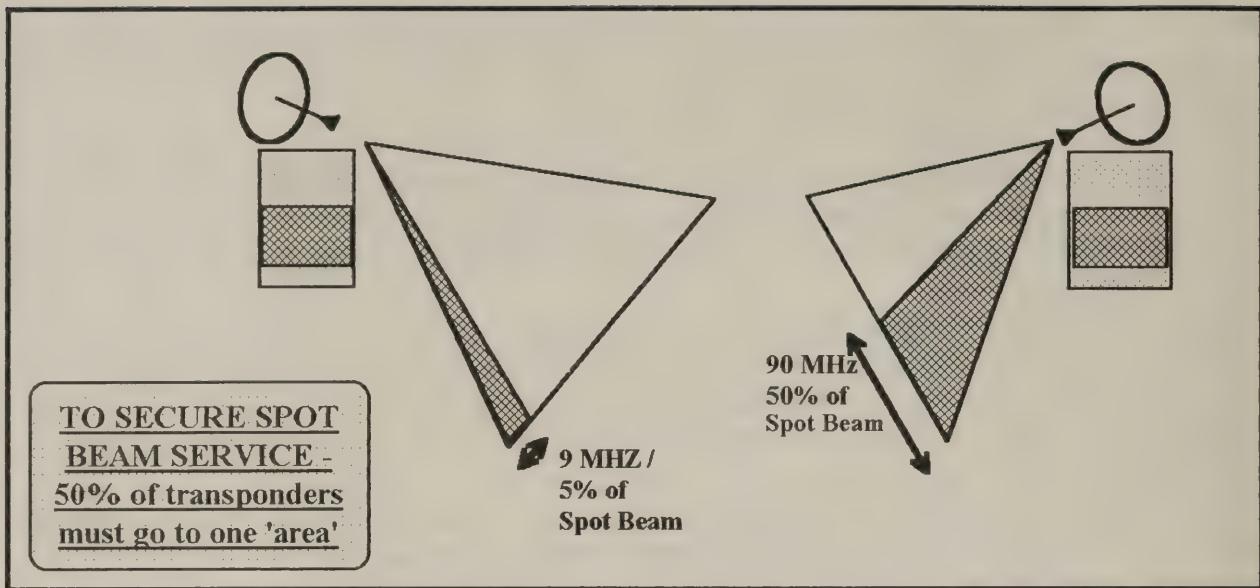
Translation?

Intelsat 703 (to be located at 177 east late this year; the satellite under discussion) has something called a 'steerable spot beam at Ku-band.' This means the ground controllers can refocus the transmission or downlink antenna to optimise the signal level on the ground over a sizeable region that extends from New Zealand in the Southeast to China in the Northwest. When the beam is pointed at New Zealand, for example, it is totally useless in China; or Darwin for that matter.

Inside of 703 five separate transponders are connected to this steerable spot beam. When the antenna is steered to New Zealand, all five transponders now favour us. There is no way to break up the spot beam such that one transponder can point at China, another at Darwin and another at New Zealand.

Our New Zealand user required 9 MHz of bandwidth; 1/4th (25%) of a 36 MHz wide transponder. Intelsat quoted US\$514,687.50 for this space. But they neglected to point out that our TV network could sign a contract for and receive this 9 MHz of space only if other New Zealand users came along and took as a minimum a total of 50% of the transponder bandwidth on this five transponder spot beam. In other words, the sum of all New Zealand users must come to 2.5 transponders (90 MHz of total bandwidth) before Intelsat would in fact point the steerable spot beam at us (!).

Bottom line: Our user thought he had a price he could make work. He had nothing but four months of time invested in getting to that price (negotiations with satellite operators are very



protracted); a price which in fact was for a service (9 MHz of space on a steerable beam that has 180 MHz of total space) which Intelsat could not deliver. Back to square one?

Not yet; it gets more complicated.

Intelsat could (not necessarily would) agree to lease you 9 MHz of space on this steerable spot beam and point the beam at you even if you were the only user on that spot beam. Unfortunately, if two weeks, two months or two years after you inaugurated your 9 MHz bandwidth service someone else came along and signed up for more than 9 MHz of space and their service region required that the spot beam be resteered to favour them, *"Intelsat shall have the prerogative to re-point the beam in any manner that will accommodate ..."* the new user. Obviously having a nation-wide New Zealand service system that could be turned off with almost no notice is not a way to run a business.

But certain 'rights' go with being the first to sign-on. Say you contract for 9 MHz of space (or any amount up to just under 50% of the steerable spot beam's 180 MHz capacity) and they provide it to you. Then a second user threatens to take capacity which will allow/cause Intelsat to repoint the steerable spot beam away from you. Are you dead at that point?

No, you would *"have 45 days to reserve additional capacity on a guaranteed basis with immediate service commencement"* provided your increase in bandwidth added up to at least 50% (90 MHz) of the available capacity on the steerable spot beam.

If 9 MHz costs \$514,687.50 per annum, by simple extrapolation 90 MHz will cost ten times as much; \$5,146,875 per year. So our 'hypothetical' TV network that requires 9 MHz of space, and perhaps could live with an annual satellite space budget of (US)\$514,687.50 per year must be prepared to either (a) increase their bandwidth commitment to 90 MHz, and/or (b) 'get off the satellite' on 45 days notice.

In effect, the Intelsat bid was defective. It offered, our system planner believed in good faith, 9 MHz of space at a fair price but in fact the 9 MHz offered was either not really available at all, or if available was subject to 45 day termination without recourse.

THE TERMS OF AGREEMENT

Intelsat is a consortium of satellite users; a 'private club.' To use Intelsat services, the rules say that the country you are located in must be a member of 'the club.' To join the club, a country pays an entrance fee. Big countries pay big entrance fees; little countries smaller fees. New Zealand paid 0.66% of the total capitalised costs (66/100ths of 1%) of Intelsat to join.

Once a country has joined (there are presently 130 member-nations), users in that country are entitled to rent space on and use the services of Intelsat. In each country (called 'signatory' since Intelsat is based upon an international UN-like treaty) there is a signatory representative. Typically, the representative is the local (national) telecommunications system owner/operator. In some countries the national government operates the telecommunications system; in others, such as New Zealand, this system is privately owned.

Telecom New Zealand International represents Intelsat here. Anyone in New Zealand (anyone ... that includes TVNZ, Clear Communications, et al) wishing to use Intelsat must negotiate a price and then a contract through the Office of Signatory Affairs of Telecom New Zealand International. Contracts are drawn to Intelsat specifications (and may weigh several kilos each) but with New Zealand law as an operating foundation. If you get into a beef with Intelsat as a client, you will be faced with New Zealand law.

Charges for use of Intelsat break down into sub-costs. First there are the categories (preemptible, non-preemptible et al) with the variations (standard capacity for lower power use, premium capacity for higher power use). Within each costing variation there are three separate charges, the total of which is your annual cost in US dollars. We show this in a table here; charges computed for a five year lease of 9 MHz bandwidth on Intelsat 703 on a Ku spot beam. Yes, this is the same bid which could only be accomplished if the user found additional users to take the 'other' 81 MHz of bandwidth required to ensure that the spot beam stayed pointed at New Zealand. But the method of calculation is no less illustrative even with that 'flaw.'

What do the charges mean?

'INTELSAT charge' should be obvious (as obvious as anything can be when dealing with the consortium). This is the money Intelsat will ultimately receive from your annual rental payment. The 'OSA charge' is not so apparent.

	INTELSAT Charge	OSA ONCOST/22%	GST 12.5%	TOTAL US\$ PER YEAR
<u>PREEMPTIBLE standard cpty.</u>	\$375,000	\$82,500	\$57,187	US\$514,687
<u>PREEMPTIBLE premium cpty.</u>	\$470,000	\$103,400	\$71,675	US\$645,075
<u>NON-PREEMPT standard cpty</u>	\$510,000	\$112,200	\$77,775	US\$699,975
<u>NON-PREEMPT premium cpty</u>	\$640,000	\$140,800	\$97,600	US\$878,400

Ku SPOT BEAM / 9 MHz Bandwidth Quotation for New Zealand

Recall that before a New Zealand company can utilise Intelsat, our country must belong to the consortium. Also recall that to join the club, New Zealand had to pay an entrance fee. Thus Telecom (New Zealand International) has an invested interest in Intelsat.

Using a formula only Telecom understands (and which they are not likely to share with you) they calculate the 'value of your contract against the total investment they have in Intelsat.' From this formula comes their 22% number; the formula tells them that if they increase the rental to Intelsat by 22% of the Intelsat charges, and keep that 22% in New Zealand, this will compensate them "on a rate of return basis" for their investment in Intelsat. This is not a negotiable point.

"GST (12.5%)" is equally obvious. Could a user avoid paying New Zealand GST by signing up for transponder space in another (national) jurisdiction? The answer is uncertain but probably no if the uplink site (point from which the material to be relayed via satellite originates) is located here. On the other hand, if the uplink site were say in Los Angeles but the receive sites happened to be in New Zealand, you might avoid paying GST by signing the Intelsat agreement from (say) the USA. You might.

The multi-kilo (weight) contract has significant fine print. A full treatment of all of the caveats would occupy a book-length dissertation. The bottom line is that your chance to get any significant change(s) from the 'standard contract' are about as good as your standing on Queens Street in Auckland and rolling a snowball on the sidewalk on Christmas Day. But there are these points of interest.

#1) Drawing the contract through the Office of Signatory Affairs will cost you money; NZ\$7,700 as a minimum to be exact.

TRUE SATELLITE SPACE LINK COSTS

- #1) Agreed-to annual lease
- #2) Uplinking charges if leased
 - a) Capital cost of uplink
 - b) Maintenance, operating, staffing uplink
- #3) Fee to draw contract
- #4) Performance bond fee
- #5) Intelsat engineering time
- #6) Intelsat Signatory office time
- #7) Your own engineering requirements (fees)
- #8) Downlink (RO) terminals capital cost
 - a) Maintenance, operating downlinks
- #9) Insurance on capital equipment
- 10) Management supervision time

#2) A performance bond will be required (this guarantees Intelsat that you will pay the contract amount). It is a rather stiff performance bond as such guarantees go. As a minimum, your performance bond will be equal to two years rental charges plus 25% of the charge on the remaining period plus GST. In the first year of a five year contract that means 40% of 5 'x' annual rent plus 25% of 3 'x' annual rent; plus GST. The bond can be redone annually as the contract term left reduces. This makes a nice bond rewrite business for your bondsman.

#3) Any time spent by Telecom New Zealand International and/or Intelsat will be 'chargeable.' For example, if you install and operate your own uplink, before it can go into service Intelsat will insist upon

conducting an engineering proof of its performance; their assurance that you will not send 'garbage' to their satellite. If you engage Telecom to provide the uplink, there will still be engineering charges for their own check out of their own equipment that is dedicated to your uplinking service.

#4) The Office of Signatory Affairs will work with you up to the point of your receiving your first bid (quotation), usually without charge. But at some point they will begin charging you (NZ\$30 per half hour plus GST) for their time. As a minimum, if their first bid results in you deciding you would like to try a new bid by modifying some of the link budget parameters (such as doubling the size of your RO terminal antennas), you can expect to be charged for the time spent in the modified bid process.

THE PROCEDURE

The first step is to contact the various satellite link suppliers; Optus, PanAmSat, Intelsat. The least likely scenario of all is that you will be able to call them, cite bandwidth and signal level requirements, and receive a quotation by return FAX. It doesn't work that easily.

Step one is to define the exact bandwidth and power density parameters you think you will require. Other factors affecting the bid will be your choice of 'service class' (again, preemptible, et al) and the length of your desired contract. Length of contract is another complex consideration.

Short term leases, whether preemptible or non-preemptible, attract maximum charges. The longer the term, the lower the annual rate. Preemptible lease agreements can range from 1 week to ten years; non-preemptible from 1 week to 15 years.

Step two is calculation of the link-budget. Intelsat (PanAmSat, Optus) engineering does this based upon the technical parameters you provide. The link budget will end up being 10-30 pages of closely spaced print showing what happens to your coverage area signals when various parameters are changed with the uplink and downlink. It takes an engineer with a complex computer programme to prepare a link budget; it takes another engineer with satellite qualifications to make any sense of the printed sheets.

And this is an important step because of the many variables that can affect the performance of your link (system). What appears to you to be a minor change in the satellite's operating parameters may in fact have a big affect on your ground level signals. Make a wrong decision here and you could be paying for it for a long time. The link budget deals only with the uplink to satellite - through the satellite to earth portion. It is still your responsibility to calculate whether the service (signal footprint) levels the link budget forecasts will in fact be adequate for your planned ROs.

If, as a potential satellite user, you are beginning to get nervous about now, this is a normal reflex. That's the 'fear of the unknown' that concerned our Radio Network Example One would-be user from page 4 here.

Once the link budget calculations are acceptable to each side of the negotiation, you move from the engineering desk of the satellite operator to the rates desk. In the case of Intelsat the engineering desk is in Washington DC and the rates desk is in Wellington at Telecom New Zealand International. Here the Signatory manager takes the relevant power and bandwidth factors from the link budget and goes to his 'table of rates.' The flexibility at this stage is limited; the manager is not running a flea market and must answer to an authority higher up. In other words the rate is the rate is the rate; without negotiation. If you want a lower rate, you change class, change power level, change contract term length. You won't negotiate off of the fixed rates for a given set of parameters.

QUICK CHECK PROCEDURE to Develop Satellite Link System

- #1) Study your needs
- #2) Develop bandwidth/power need study
- #3) Survey receive system hardware available
- #4) Create first-cut budget for annual operations

- #1) Contact potential satellite system suppliers for studies
- #2) Study link budgets received
- #3) Select class of service and request bids
- #4) Compare bids and redo annual budget

- #1) Negotiate contract
- #2) Complete funding
- #3) Order/schedule RO / VSAT equipment
- #4) License as required
- #5) Schedule installation(s)
- #6) Conduct 'Beta' Test
- #7) Complete installations
- #8) Schedule maintenance

Anyone signing a contract has the option of 'upgrading' to a higher level of service at any time; provided of course there is a higher level of service not spoken for. If you begin with preemptible standard capacity and find you need premium capacity (higher power) after the fact, this is a relatively simple change. The satellite power is simply 'turned up.' If you start with preemptible and wish to change to non-preemptible, or guaranteed, there has to be an 'opening' in the chosen class for you to upgrade. Recall that (economy) class preemptible exists ultimately as emergency transponder space for a guaranteed customer who is unfortunate enough to have his transponder fail. On a 'full bird' and with you in economy preemptible class, there's no upgrading possible. Upgrading is another sub-world all to its own rules and suffice to say that if your plans include the possibility of upgrading, spend adequate legal time dissecting and understanding what your upgrading rights really are. This can be tricky.

YOUR OWN UPLINK?

Telecom International presently maintains, for example, uplink connections with Intelsat 701 (174 degrees east) and 510 (180 degrees) as well as Optus. Should you select any of these satellites, you have the option of arranging for Telecom to uplink you to the bird of your choice. Uplinking fees are never an automatic part of a contract and must be considered separately.

An uplink consists of a sizeable dish antenna, a transmitter to feed the dish, and the necessary 'baseband' equipment to interconnect your audio, video or data signals to the transmitter. Not inclusive of real estate costs, a television uplink will cost you from \$300,000 to in excess of \$2,000,000 to install. It will also require a license through the Ministry of Commerce to operate. The license should be the least of your hurdles.

The link-budget dictates the amount of signal your uplink must generate. The uplink design offers some flexibility in design. For example, a Ku uplink dish antenna 10 metres in size with a 100 watt uplink transmitter could send the same amount of signal to the satellite as an uplink antenna 6.7 metres in size using a 200 watt transmitter. So in planning your uplink, you consider whether it is better to use a bigger antenna or a bigger transmitter. The basic arguments are that as you increase either power or size you increase costs and there will be a point on a cost-curve where the power and dish size are optimised for your application.

As a rule of thumb it requires far less antenna size and far less transmitter power to link a 50 kilohertz wide radio network signal to satellite than it does to link a 9 MHz wide digital (or wider if analogue) TV programme. An audio-only uplink can typically be installed for under \$100,000.

If you operate your own uplink, in addition to the capital cost of installation, there are two other important considerations:

#1) It will require staffing; 24 hours per day. No more than one person at a time, typically, but no less either. That's a cost.

#2) You can rent it out.

It is the second item that is of interest.

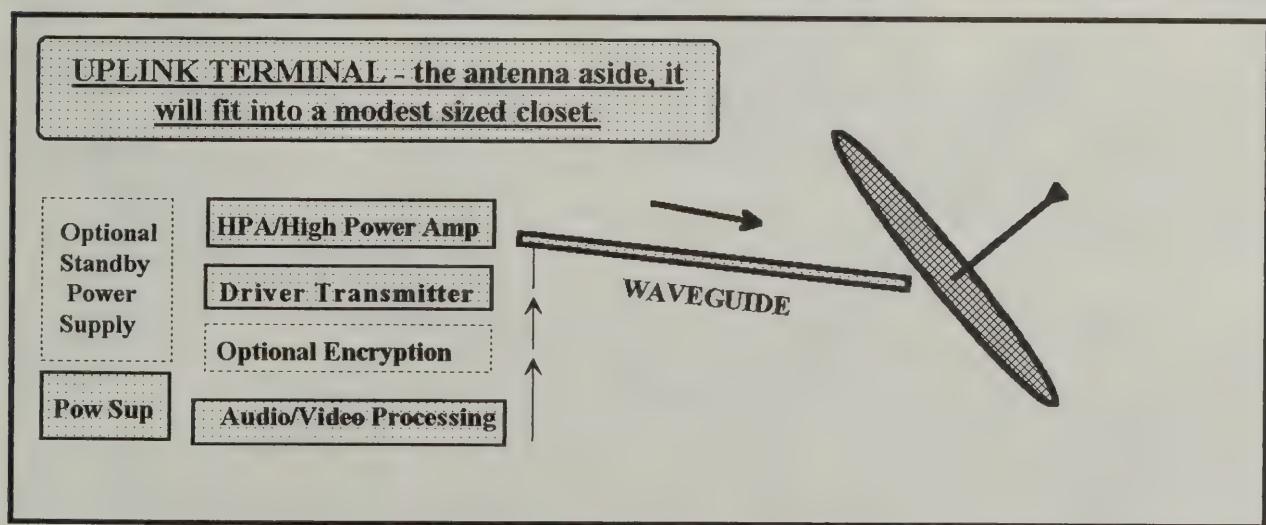
Let's say you are a user of PanAmSat and while you might be the first, in a year or two there will be others. Each will face the same uplink dilemma; use Telecom, build their own. You offer a third option: you will uplink for them.

Once your antenna is installed and you have a building for the equipment, plus a staff, it becomes a relatively inexpensive matter to add a second transmitter (sharing your one antenna) for a second uplink user. And a third, and a fourth and so on. This puts the first uplink operator in the uplink business.

And if world experience is any guide, you can offer this service for a fraction of what Telecom might charge. That makes an uplink a business of its own once you are uplinking for someone other than yourself.

If you like this reasoning, your initial selection of an antenna will have to be reconsidered. Let's assume your use is for an audio only channel so you can get by with a smaller (perhaps 5 metre) antenna. But in making that decision, you are pretty well ruling out that you can take on a video uplink client since their video will require a bigger uplink antenna than your audio. It may pay you to configure the uplink portion as a separate company with its own capital base, separate from your networking needs, to allow you to handle the finances for the uplink separate from your other operations. Additionally, the physical space required for the uplink equipment (an oversized closet is all you need for just yourself) and the way you design the cabling system becomes another plan-ahead consideration. Hundreds of privately owned uplinks exist world-wide; many actually make money at it. The same could be done in New Zealand.

One possible problem with an Intelsat space-link contract is worth noting here; Telecom New Zealand International may, or may not, be pleased if you opt to install and operate your own uplink. They, after all, have uplinks scattered throughout the country and will resist the establishment of new uplinks that go to the satellites which they represent. If your proposed uplink



location is any distance from an existing Telecom uplink, to use their uplink you will need to somehow interconnect your (studio) facility with their nearest uplink. This terrestrial link will often turn out to be as expensive to you on an annual basis as the entire space-link portion. That alone will be a sound business reason to consider your own uplink; simply ask yourself "*If I pay the terrestrial linking charge to Telecom's uplink, how many years would it take me to pay for my own uplink with the same annual charges?*" The shorter the payoff term, the more feasible the uplink being in your own back parking lot.

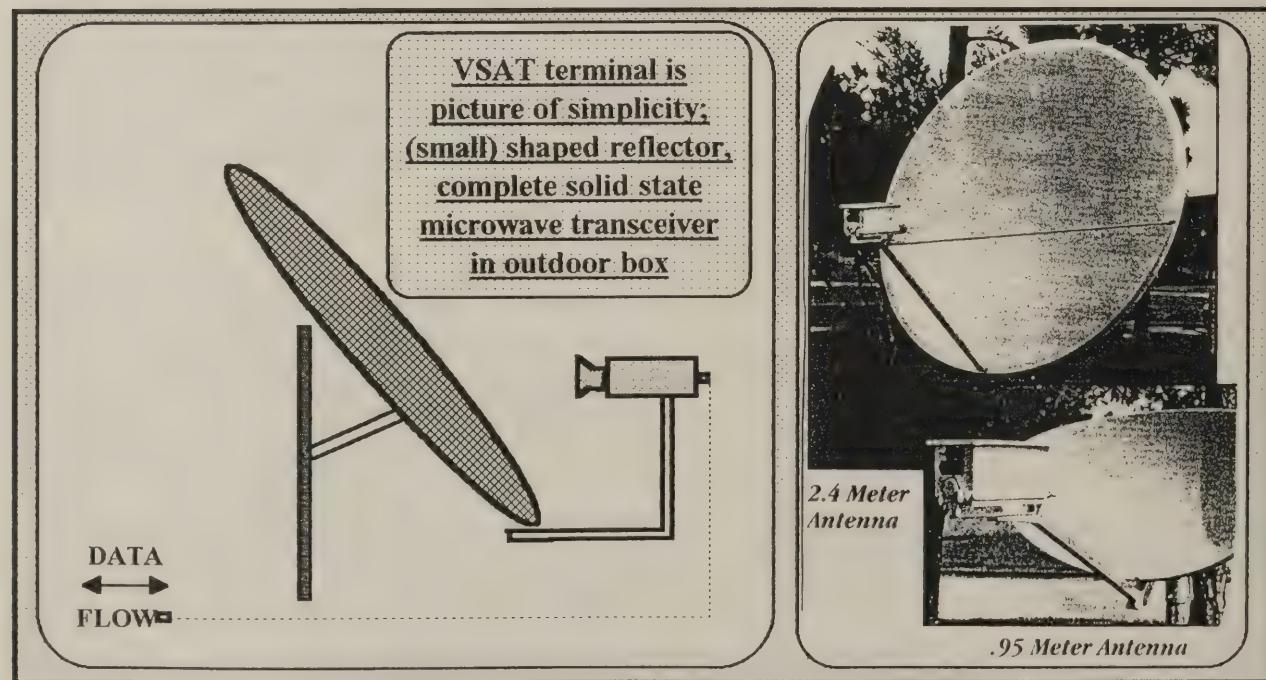
Finally, an uplink will have to pass a few associated 'tests' to be built. These include the possible environmental impact (size of the dish versus where it is located), possible interference (from, to other microwave links in the area) and the reliability of the AC mains power system in the area (worst case: emergency standby power).

MINI DATA TERMINALS (VSAT)

Many of the minor problems associated with audio or audio/video uplinks go away with VSAT terminals. VSAT basically means "very small aperture terminal" which translates to a dish sitting on a roof or aside a building and attracting no particular attention and causing no particular problems.

A VSAT system is basically having the bandwidth advantages of a fibre optic link (see CTD 9409) without the fuss and bother of running the fibre optic cable. A VSAT terminal can interconnect a branch of ASB, for example, to the headquarters from any point in New Zealand; a McDonald's franchise to New Zealand, even American headquarters; an EFPTOS terminal with a central computer. Or, a Four-Square grocery outlet to the regional distribution centre. All without wires, without fibre optics. Voice, data, FAX and even slow-scan video can be supported at speeds to 256 kbps.

VSATs work at both C and Ku bands. Dish sizes vary downward from someplace around 3 metres to well under 1 metre. A VSAT transmits and receives data in any convenient to the user format. It does this by being assigned a 'channel' or frequency on the system satellite through which it transmits and receives. Because the bandwidth of the (data) channel can be quite small



(less than even an audio-only radio network requires), the link budget for a VSAT system allows significant reductions in the remote terminal antenna sizes and transmitter power.

A VSAT system has tremendous planning/hardware flexibility. For example, given the proper planning the master terminal (such as at ASB headquarters) could employ a large dish such as 11 metres. By building extra transmit and receive gain into the master terminal location, the gain (size) and power of the remote terminals can be reduced proportionately. This is a common approach when the VSAT remote terminals must go into highly congested, built-up business centres where even antennas 1 metre in size would present installation problems.

VSAT systems require spectrum space on the satellite and therefore there will be a negotiation with the satellite carriers. Intelsat has a dedicated service called Intelnet that caters to VSAT dishes down to 0.6m in size for our region. VSAT negotiations are usually less complicated than say television relay, and while all of the rules previously cited apply, one negotiation will usually suffice for the master uplink terminal plus any number of additional remote VSAT terminals.

Basically, a VSAT network involves renting a narrow sliver of spectrum space and once the engineering thresholds for approval have been crossed, that sliver is the user's to operate and police.

Costs? The spectrum space segment will be proportional to the bandwidth; it could be as low as NZ\$50,000 per year for a sliver that will handle the needs of say a nation-wide Four-Square class of operation. The remote terminal hardware is configured with the microwave transmitter/receiver in a weatherproof box at the dish proper; no indoor space required (you still have to plug it in to AC mains however). The dish plus the microwave 'transceiver' could be as low as NZ\$10,000 per site.

Data modems at each terminal accept any user defined data 'sense' (protocol) and the satellite link becomes transparent to the user; basically it is one data terminal talking with another even though the two may be separated by hundreds or thousands of terrestrial kilometres and there is a round trip earth-space-earth link approaching 75,000 kilometres between the two terminals. Anything you can send down a telephone copper wire or even fibre optic line you can interconnect with VSATs or their more modern derivatives the USAT (U for ultra ... small etc.).

So VSAT/USAT installations, while hardly common today in New Zealand, would appear to be a genuine growth industry in the last half of the 90s. What has been missing until now has been reasonably priced satellite capacity. And that is now changing.

SUMMARY

Private satellite links have been proven, fine tuned, economised over more than 15 years in other parts of the globe. In North America and Europe they have replaced often expensive leased telephone company circuits, in other cases they have made it possible to monitor and control remote switching stations or deliver television and radio to regions previously unreachable by adequate terrestrial links. There is little reason to believe our own experiences will markedly differ. There are many business opportunities in this newly emerging field.

-PIONEERING KIWI SATELLITE LINK DESIGNER/SUPPLIER-

Readers with an interest in evaluating a possible satellite solution to a data, voice or other bandwidth point to point application (either within New Zealand or from/to New Zealand and foreign points) are recommended to contact SATELINK LTD. (P.O. Box 38857, Wellington Mail Centre, Wellington; FAX 04-385-7263) for an informative brochure outlining systems utilising antennas in the 1.8 to 3.8 metre range. CTD will revisit this subject in a future issue focusing on PanAmSat C and Ku band circuit options and costs.

AUSTRALIA'S PAY TV ACTIVITY MOVES TO COAXIAL CABLE FORMAT

BACKGROUND

More than ten years ago Australia first considered legislation which would have allowed the development of 'pay television.' In the interim at one point or another the 'official Australian policy' regarding pay television has vacillated between favouring satellite delivery (using Aussat/Optus as a delivery vehicle for programming), MDS/MMDS (2 GHz frequency range point to multi-point microwave) and fibre optic cable. Through all of these perturbations in official policy the only continuous thread of continuity has been that not one of these favoured systems has ever reached past the test stage and into commercial operation. For each new 'flavour of the month' system companies have been formed, investment capital has been raised, hardware ordered ... and hopes dashed by subsequent changes in policy. It is not picking on Australia to observe that no other developed, English speaking country has spent so much official time on the subject with quite the same result; no service at all to the average citizen.

The latest change in official policy occurred in March with a government announcement spearheaded by detailed press releases from Telecom Australia and a (new) company calling itself Cable Television Services (CTS). With these announcements the Australian people were once again promised 'an early start of direct to the home pay television;' this time, using traditional, analogue delivery, CATV (coaxial cable) as a delivery medium.

It would not be difficult to dismiss this latest 'plan' by merely reciting the history of similar announcements and promises to a country that in the very best of cases enjoys five channels of terrestrial television dominated by three very competitive commercial networks. But, there are subtle differences between the most recent plan and those that preceded, foremost of which is that the provider of the latest announced service is none other than Australia's own telephone company; Telecom. The latest plan, as announced, goes like this.

Telecom has begun building, they say, a cable TV network using 550 MHz amplifiers and traditional .750"/19mm coaxial cable. The network is to be / is being installed primarily in underground cable ducts already in place parallel to the existing Telecom telephone network and construction has / will start more or less simultaneously in and about Sydney, Melbourne, Canberra, Brisbane and the Gold Coast. Telecom will then lease out, on contract, bandwidth segments to privately owned companies who will provide the programming. Telecom says the network will be initially operational as early as this July in at least some segments of Sydney, it will be available to 150,000 Australian homes by July of 1995, and will within 3 years be available to 1.1 million Australian homes; 20% of the total.

A parallel announcement from a group calling itself Cable Television Services (CTS) claims they have leased from Telecom 70 MHz of bandwidth on the network and they will offer to Australian homes 10 channels of television. CTS is said to have a 'license' from the Australian Broadcasting Authority for this undertaking. CTS also claims they have negotiated a non-exclusive Australia contract with Turner International that will allow them to bring into Australian homes three satellite delivered services: (a) CNN, (b) Turner Network Television (TNT), and, (c) The Cartoon Channel. Unlike cable/CATV systems in North America/Europe, CTS does not plan to offer any

service from the terrestrial TV broadcasters in Australia; these will continue to be available only over the air. The legal 'right' to carry on cable terrestrial (free-to-air) broadcasters has never been determined in Australia. In addition to CTS, Australian sources say that four other companies have received license-permission to provide similar 'pay TV' services but none of these firms are known to have signed a contract with Telecom to lease bandwidth on the announced system.

Money. Telecom claims it will invest A\$750m in the project, slightly more than A\$700 for each home that will potentially have the option of connecting to the system. CTS says Telecom will provide a 'subscriber terminal' (read: cable TV converter box) and there will be a one-time initial connection fee in the range of A\$175-200, payable to Telecom, to become a subscriber. CTS also says that their ten channels of programming will come into the home typically at A\$10 per week; A\$43 per month. No programming channels other than the three from Turner International have yet been specifically identified although CTS has subsequently said an (additional pay) movie-channel will be a part of their service at some unspecified date. The man in charge, at Telecom, of this new venture is Gerry Moriarty, late of Television New Zealand.

CTD has learned that amplifier and passive electronics for the system will most probably come from US company Magnavox, owned by Philips. Magnavox has manufactured cable television amplifiers and plant equipment since the early 1970s under that corporate name and traces its origins through an earlier firm called Craftsmen Electronics to the mid 1950s. Magnavox 550 MHz capable amplifiers typically allow a forward (cable headend to home) bandwidth of 496 MHz using the spectrum 54 to 550 MHz. The amplifiers are designed such that field-added plug-in circuit boards allow a return band spectrum from 5 to 35 MHz and this makes possible a limited form of interactive communication between customer 'cable converter' set-top boxes and the cable company ordering and billing computers. The Magnavox 550 MHz amplifier technology is quite mature having been in the field and operational for nearly five years. In the United States and Europe the 'current technology' is for 750 MHz amplifiers offering a forward bandpass of 696 MHz (54 to 750 MHz). The difference in cost for 550 MHz equipped systems and 750 MHz equipped systems is not inconsequential although the 750 systems have bandwidth for 99+ PAL format 7 MHz TV channels rather than the 70+ possible channels with 550 MHz equipment. Telecom's choice to use 550 MHz equipment is a 'conservative' but probably cost effective decision.

Reaction to the announcements has been largely favourable although the Australian media is having something of a field day with the often conflicting background information released by the participants. In reading the releases from CTS and Telecom, in particular, it appears the people who wrote the releases have limited knowledge of what cable television is or how it works; a classic case of "*Two days ago I couldn't spell cable TV operator, and now I are one!*". On the other hand, the technical-media journalists who are reporting on these announcements and participating in the media question and answer sessions have never been faced with cable TV either so many of the questions asked and the answers reported in print rather aptly illustrate the principle of "*the blind leading the blind.*" Reports reviewed by CTD are often factually inaccurate and readers are cautioned that when reading Australian media on the subject there will be an inevitable 'learning curve' as both the participants in this new industry and the journalists covering it come up to speed.

The most glaring error of fact would appear to be in Telecom's reported investment (costing) for the new system. While it would certainly be possible for Telecom to invest around A\$700, for

example, in the system to reach each potential home, such an expenditure would never receive investment banker backing in Europe or North America where identical systems seldom exceed A\$300 per potential home. One Australian journalist writing about this believes that Telecom has (a) done its sums incorrectly, or, (b) more likely is rolling into the cost figure rather substantial investments previously made by Telecom in its fibre optic infrastructure. This same journalist quotes a study by New Zealand telephone investors Bell-Atlantic and Ameritech done in 1992 in which the American telephone firms found Telecom (Australia) had rather optimistically installed so much fibre optic capacity between exchange centres and population centres that they have in the ground something approximating the bandwidth capacities required through the year 2020; or beyond.

CTS, the first announced provider of pay TV services that will lease bandwidth capacity from Telecom, has also been the subject of both investigative journalism and considerable speculation. CTS is headed up by one Lynton Taylor whom Australia's best known and most respected technical journalist Stewart Fist describes as "*Kerry Packer's right hand man at The Nine Network operation for the past ten years.*" Fist ponders how deeply involved Packer plus Rupert Murdoch are in the CTS and Telecom plan. Taylor's most recent assignment has been to advise Australian Sky Channel concerning their expansion of off-track horse race betting using Intelsat and Palapa satellites to a projected world-wide audience (see Technology Bytes, this issue, page 25). Prior to that, according to Fist, Taylor was active in a consortium of (Kerry) Packer, (Rupert) Murdoch and Australian Telecom (the so-called PMT Consortium).

CTS claims they have been a participant in a trial-test of cable television in Sydney's Centennial Park district. A CTS press release states the trial has been offering 300 homes 20 channels of television through a Telecom hybrid fibre optic/coaxial plant. On paper this trial system sounds very much like the New Lynn/Pakuranga New Zealand Telecom trial launched last October. To the contrary, journalist Fist says, (that) "*CTS had no substantial part in the trial since the company apparently did not exist until very recently, (that) the system in fact carries only 6 new channels (not 20) and (that) Packer's Channel 9 has been supplying those six channels through its Artamon (Sydney suburb) headquarters by stripping off of Intelsat (satellite) CNN, ESPN and other US services.*"

While the Australian journalists have gone off eagerly trying to sniff out some back room agreement which they suspect exists between Murdoch, Packer and Telecom with CTS as a 'front' for all three, CTS meanwhile has announced how it intends to finance the operation. The company has been capitalised, it reports, with an A\$10m investment originating from a company called Chelsea Securities. The securities company is to acquire CTS and change its (own) name to Cable Television Services Limited. They then hope to qualify for (stock market) listed status and raise A\$40m additional funding through stockbroker D.D. Tollhurst.

It is in the area of cable finance that another example of 'faulty sums' appears. CTS, perhaps in preparation for the offering of A\$40m in securities to the Australian investor public, has announced a forecast of 30% take up or penetration of its service in the first year (i.e., 3 out of every 10 homes are projected to subscribe). Using this as a basis for projected earnings, CTS then proceeds to make a case for how it will invest its A\$10M 'seed money' plus the A\$40m it anticipates raising from the public.

A thirty percent penetration of 150,000 first-year-based homes would be something of a world record in the cable television business. The circumstances suggest the take-up will be far lower. World-wide experience has shown that where a 'pay television' system appears offering ten new

channels to a marketplace that already has five 'free to air' channels, and where none of the 'pay TV channels' will include the magic of 'recent, theatre release movies,' the penetration rates seldom rise above 12-15% in year one (SKY TV in New Zealand is just now passing 20% after 3 years of operation). Given this reality, should CTS actually achieve the 30% penetration it is forecasting, it will attract the world-wide wonderment of a cable industry who would applaud the CTS marketing skills. CTS has alluded to the availability of a 'premium, first-run movie' service as well but has given no details of the extra-cost channel. Journalist Fist points out that Murdoch owns the Fox movie library (and indeed, Murdoch's Fox is launching its own 24 hour per day exclusive-to-cable network in July in the US) while Packer is believed to have cleared 'pay TV rights' for many of the films he has booked in advance for his Nine Network. Fist also suggests that Packer's heavy involvement in sports provides a 'programme bed' for the creation of an Australian sports network perhaps patterned after American ESPN.

So the speculation is rampant in Australia as this latest 'alternative delivery mechanism' for 'pay television' attempts to get underway. The impact of all of this on New Zealand is likely to be marginal except in one important area; the delivery, via satellite to Australia of programming sources such as TNT, the Cartoon Network (plus CNN) and others. To go 'live' from the US to Australia the programming must pass through satellites that also cover New Zealand. Today, the 25th of April, only Intelsat operates such satellites (174 east, 180). However, Turner International has an announced agreement to rent transponder space from PanAmSat and their PAS-2 satellite scheduled for service around mid September (see Technology Bytes, this issue including response from NZ SKY Net's John Fellet). One Australian journal suggests that Turner International programme services will 'temporarily' come to Australia via Intelsat, "*migrate to Chinese Apstar 1 satellite from July, followed by PanAmSat later this year.*" This is another one of the errors that has so often crept into reporting on even satellite subjects in Australian media.

#1) Apstar 1 will launch (lift off for orbit) sometime in July using a Chinese launch vehicle. With a successful launch in July, the Apstar 1 would conceivably be ready for 'service' by early September.

#2) The Apstar 1 'footprint' (area it will cover on the earth) has been carefully designed for Southeast Asia. Their own literature states "(coverage of) Bangladesh, China, Japan, Korea, Mongolia and Southeast Asia;" conspicuous by its absence on the list is Australia. While it would be possible to construct a 16 metre size receiving terminal to produce pictures from Apstar (in say Sydney) this seems an unlikely temporary venture.

#3) More importantly, PanAmSat PAS-2 is presently rescheduled for launch in mid-June, actually a few weeks ahead of Apstar, and it is likely to be in operational service before ApStar.

Meanwhile, Turner's new Asia-region office in Hong Kong tells CTD that TNT and Cartoon (Net) will be 'repackaged' in Hong Kong facility into a single (24 hour) per day channel; not the two channels available in USA. They claim it will be distributed in Asia on Apstar (September-October start) and South Pacific users may not fit into their plans, at all, in the near term.

All of this suggests that TNT and Cartoon Network in their USA-format may not be available in the Pacific, nor to Asia, at all. For CTS (or a home satellite industry in New Zealand) to survive there must be programming available. Asia's increasingly competitive satellite delivery services (see Technology Bytes this issue) is rapidly shifting away from English programme delivery to regional and nation feeds for each distinct (national) market. If Australian cable viewers are going to tune-in the world of tomorrow, they may need to master Mandarin as a second language.

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April 26, 1994 / ISSUE 94-04-08

SATELLITE TV

PanAmSat PAS-2 satellite, originally scheduled for Ariane launch in mid-May to an operating position at 169 east, has been rescheduled to a mid-June launch. Ariane launch services experienced a disaster during a January launch for a pair of European satellites and both were lost. Ariane believes it has identified the malfunction that caused the loss but in the process missed launch dates in February, March and April. PanAmSat is racing to beat several other Pacific satellites into operation and was able to convince Ariane to move launch ahead one month, from an earlier July-August launch replacement date, to mid June. Given this scenario occurring, PAS-2 should be on station and operational shortly after the first of September.

Intelsat has confirmed to CTD that satellite transponder space on the Southwest Zonal Beam (SWB) from 174 east is rapidly being leased out. Although very few announcements have been made by likely users of the new (in January) satellite, there has been considerable bid-activity at Intelsat on behalf of firms who say they would like to use this satellite. The SWB provides coverage of much of (southern) Australia, New Zealand, to C-band antennas as small as 2.4 metres in size for broadcast quality service using digital compressed video. Quoted C-band price is US\$432,337 per annum for 9 MHz bandwidth premium capacity (high power) preemptible versus US\$645,075 for Ku-band (see page 13, this issue).

RIMSAT's third Pacific satellite scheduled for launch from Russian Baikonur launch site between 15 and 25 April. Previous Rimsat birds leased from Russia are known as Gorizont 17 (134 east with SUN-TV programming), Gorizont 28 (130 east with unknown traffic). Likely, not confirmed, location for latest Gorizont is 142.5 east (due north of Croydon, Queensland). New satellite has capability of serving New Zealand, Australia (using steerable beam) if customers wished at C-band footprints to 44 dBW (1 metre size dishes) but no announcements yet as to users.

Australian Sky Channel hoped to launch this month a 'Pacific Rim' satellite distribution service for horse racing events from major Australian tracks. Both Intelsat and (Indonesian) Palapa satellites will carry live coverage of the races with a supporting betting service through an international telephone hookup. While in theory the Intelsat service does reach into the western portion of the United States (including the Las Vegas/Reno region), as a practical matter the sizeable satellite dishes required for Intelsat reception will probably stunt acceptance of the service there. A proposal to link the Intelsat feed onto a US domestic satellite for distribution to smaller sized C or Ku band dishes is under study. The service began testing last July and has appeared sporadically on The Nine Network transponder (Intelsat at 180 degrees) since that time. How New Zealand pubs, racing clubs and others who may wish to be a part of the link will participate has not yet been announced.

OPTUS Communications Pty Limited, owner of Australia's domestic Ku-band satellite system, has taken in a significant new investor; Kerry Packer's Nine Network Australia has purchased 15%. To make room for Nine as a stockholder, existing participants BellSouth (US telephone operator) and Cable & Wireless (UK based world-wide telecommunications operator) have voluntarily diluted their shares. Nine has until August to complete bank financing and post A\$318m for the 265 million new Optus shares to be issued. Under the new investment there will be seven

-COOP'S FEARLESS SATELLITE PROGRAMMING FORECAST-

The phone rings and a voice asks "*What can you / are you going to be able to get with a satellite dish?*" The truth is we are not sure, yet. But the pieces are falling in place and here's what we see happening (percentage of certainty, service, likely satellite):

100%: CNN (508 + PAS-2); **ESPN** (508); **ABS/CBN** (Philippines) (PAS-2); **Australian Sky Horse Racing** (508); **75%:** **TNT/ Cartoon Network Asia** (PAS-2); **Viacom MTV/Nickelodeon/VH1** (PAS-2); **Discovery Asia** (PAS-2); **Murdoch UK Sky BBC World Service/Prime Sport/Star Plus** (PAS-2); **50%:** **Fox Cable International** (PAS-2); **Country Music Television** (PAS-2); **Comedy Central** (PAS-2); **25% USA Network**.

-APRIL 25th UPDATE - PACIFIC SATELLITES-

177W/Intelsat 510: 510, moved here from 174 east, should be satellite now at this position. Inclined orbit +/- 1.3 degrees, seldom carries video.

180/Intelsat 508: Now 2.3 degrees inclined orbit (to +/- 3.0 by December); scheduled replacement by 701 in April 1996. Primary TV satellite for South Pacific. Watch 4135 MHz (Nine/Australia) network for likely increased activity leading up to kick-off of CTS cable service in Australia.

177E/Intelsat 511: Inclined orbit now +/- 1.3 degrees; scheduled for 703 replacement last quarter of this year. AFRTS (B-MAC scrambled) here but now with left hand circular (LHC) polarisation rather than normal RHC; occasional Japanese, other unscrambled video.

174E/Intelsat 701: New this past January, geostationary. Primary telephone, data satellite; has C + Ku capabilities. Watch for increased C/Ku band video to Australia (Cartoon Network, TNT, other feeds) over next 90 days as CTS cable Australia prepares to launch service.

169E/PanAmSat PAS-2: Now rescheduled for June launch; testing 'on station' could begin as early as 3 weeks after launch. Full-time service likely by 6 weeks after launch. Note: Discrete vertical/horizontal polarisation.

142.4E/RIMSAT: Scheduled launch at press-time possible to this location; likely transponder for testing 1(3725) or 9(3875) by mid-May.

134E/RIMSAT: 3725 MHz, SUN TV (typically 12 midnight-3AM NZT), inclined orbit (variation not known).

130E/RIMSAT: Gorizont G28 here since December, no observations reported.

131E/Apstar1: Scheduled July launch, September turn-on. Forecast levels into New Zealand are low (21-22 dBw) but could still be 'detectable' on 3 to 5 metre size dishes. Note: Discrete vertical, horizontal polarisation.

Errata: See **CTD 9403**, p.20 for audio subcarrier frequency data.

firms holding Optus stock ranging from investment house Mayne Nickless (21.25%) down to 5.2% held by National Mutual. Australians controlled 51% of the total shares before the admission of Nine; after the sale, Australian firms will control 58%. Nine presently controls a single C-band transponder on Intelsat 180, is rumoured (but not confirmed) to hold an option on 10 transponders aboard AsiaSat2 (100.5 degrees east, first half 1995 launch). In announcing the admission of Nine Network to the 'Optus club' the joint release noted that Nine brings to the Optus system *"a key strategic relationship which will prove invaluable as (we) face the dynamic changes looming in both telecommunications and television."* The inference throughout the release is that Nine Network will programme some of the Optus channels with programming for distribution via satellite to an Australia-wide audience (see report here on the newly announced Telecom CTS cable TV service; p.20). Optus possesses the ability to serve New Zealand with 1 to 2m dish size Ku-band signals.

-INTELSAT 180 Degrees LOADING / 25 APRIL 1994-

NOTES: All transmissions right hand circular (RHC). Times, where given, are in New Zealand standard time in effect April 1994. For audio subcarrier frequencies see **CTD 9403**, p.20. First number (**TR1**) is transponder/dial #; second (**3720**) is downlink frequency in megahertz; third (**27 MHz**) is bandwidth of signal; fourth (**28 dBw**) is apparent average signal level over New Zealand.

TR1/3720/ 27 MHz/ 28 dBw: ESPN, B-MAC scrambled, 24 hours. **TR3/3765/** 36 MHz/ 27 dBw: CNN, CNBC, BBC+syndicated feeds (Oprah, Donahue, et al) to Australia/NZ usually vidiplexed (2 video signals on same carrier), 24 hours. **TR7/3845/** 36 MHz/ 28 dBw: CNN International, 24 hours. **TR9/3876/** 20 MHz/ 25 dBw: NBC, CNBC vidiplexed, 24 hours. **TR10/3894/** 20 MHz/ 25 dBw: (Los Angeles) ABC, CBS, others to Australia 9 vidiplexed, 24 hours. **TR14/3975/** 36 MHz/ 26 dBw: Worldnet, C-Span, Deutsche Welle (7-8AM), 24 hours.

TR16/4015/ 22-26 MHz/ 26 dBw: (US) ABC with occasional NHK US to Japan feed interruptions including live, tape delayed sports feeds from USA to Japan, 24 hours. Note: Leitch (system) scrambling for feeds to NHK begun April 06. **TR18/4045/** 30+ MHz/ 27 dBw: RFO Tahiti typically 7AM-9PM daily, earlier on weekends, SECAM colour (displays OK on PAL set). **TR22/4135/** 20+ MHz/ 25-28 dBw (varies): 9 Australia inward and outward feeds including some BBC/ITN, 24 hours. **TR23/4166/** 20 MHz/ 22 dBw: inward materials (typically 0500-0800), TVNZ 6PM news (daily) outward, occasionally used for Holmes/other interview linkups to offshore points. **TR24/4188/** 20+ MHz/ 22-26 dBw (varies): daily use for incoming BBC/ITN/British Sky sports, news feeds to TVNZ plus occasional US CBS programmes in PAL format.

PERSPECTIVE: GOOD-BYE TAPE

Every devoted fan of Star Trek: The Next Generation knows full-well that in the year 2350 mankind will no longer be recording sounds or pictures or data on a mylar/plastic tape. And anyone in the computer field realises that while hard discs are nice, now, and CD-ROM drives are getting 'nicer' all of the time, they too will pass.

The question on the minds of the people who make a living designing, manufacturing and marketing present day forms of recording medium materials is not **if** but **when** inexpensive 'Flashback' or 'flash memory' modules will be available. The answer is **this** July. Ooops, there goes TDK stock.

Flash memory uses no moving parts; no idler wheels, no moving arms to position the tape, no tape heads that clog or wear out or stop working just because you were careless and spilled beer into the guts. Flash memory is to audio and video recording what collecting solar power from the sun is to satellites in space. It is all solid state, nothing moves to record or playback information, and in theory it should never wear out. Obviously people who make audio and video tape are concerned about the speed with which flash memory appears in consumer products (it is already available in very expensive industrial equipment).

Norris Communications, Poway, California plans July delivery of its pioneering Flashback (tm) personal voice recorder at a price of NZ\$358. Intelligent, Norris has designed the container for the new machine such that the user buys and slides into position a SoundClip module. Each module can loosely be compared to a cassette tape (audio or video) as it has a maximum record length (time limit). The first 30 minute SoundClips will retail for a suggested NZ\$124. You might recall the price of the 'first' colour TVs, the first home VCRs, the first home computers.

This is what concerns a trade association calling itself the ITA, International Transcription Association. ITA members make and sell virtually all of the blank tape and CD discs the world now consumes; 1.871B audio tapes in 1993, for example (CTD 9401; p.30). ITA issued a report in March stating "*We believe solid state memory will not catch up with tape in terms of cost for perhaps ten years, but that does not mean it won't begin to displace tape before that time.*" Translation? Unless TDK starts offering Flash Memory devices, don't hold onto their stock for the long term.

Norris's SoundClip is about the size and shape of our 50 cent coin. 60 and 120 minute versions will be available late this year. Their Flashback recorder is shaped like, looks like, "*a computer 'mouse' that someone has stepped on*" according to one US source.

The ITA sees solid state recording on sound clip like devices capable of holding up to 180 Mbytes or 75 minutes of CD quality music within 36 months; clips that can hold 100 gigabytes of material are forecast within ten years. A gigabyte is 1,000 megabytes. Your present computer hard disk may be 100 megabytes capable. Consider how 'powerful' the sound clips ten years hence will be when they are the size of our 50 cent piece and hold 1,000 times as much material as you present hard disk can store.

All of this is possible because the microelectronics industry is currently doubling the number of transistors it can 'cram' onto a fixed-size chip each 18 months. The 100 gigabyte 'clip' will contain several billion individual transistors in about ten years time. **Or less.**

If's the **or less** part that worries the membership of the ITA.

Australia's 'winner' of the gigantic raffle for permission to create an (Optus) satellite fed direct-to-home pay TV service may now have major problems raising capital for its venture. UCom/Australia outbid numerous competitors with an A\$200m offer to purchase 'exclusive (satellite) TV distribution rights' for pay services in the country. The fees were finally paid to the Australian government earlier this year and two firms (Continental Venture Capital, Ltd. and Century Communications) joined to form Continental Century Pty. Ltd with a 91.5% stake in the UCom/Australia venture. With the recent announcement that Telecom Australia will lease out analogue coaxial cable TV 'bandwidth' to programme suppliers in all major Australian cities, this leaves UCom/Australia in a difficult venture raising capital position. UCom/Australia thought it was buying 'exclusive, head-start, pay-TV rights in Australia' for its A\$200 million. Apparently the fine print that read 'exclusive satellite rights' should have been more carefully examined before the cheque for 200 million was cut. The string of government managed 'satellite fiascos' was going to make raising venture capital difficult; with the appearance of the Telecom cable competition, difficult may be an understatement. They may not even try; one report suggests Ucom will convert to being a satellite programme supplier via OPTUS (under the name OPOC Pty Ltd.), selling its services to new cable and SMATV (satellite master antenna) systems and dropping an interest in the direct-to-home market altogether. Signals in the

-CHANGING VIDEO CONTENT OF INTELSAT / PACIFIC SATELLITES-

Almost no privately owned satellite dishes in New Zealand were designed to receive more than one satellite. Most mounts were created such that the installer could locate Intelsat (at say 180 degrees), peak the signal, and 'tie the dish down.' Few of the Kiwi built designs have the ability to 'track,' that is, rotate the dish in azimuth from side to side such that more than one satellite can be focused on, tuned in (see **CTD: 9312**, p. 13). Dishes 'track' the Clarke Orbit Belt by having a 'tracking mount' (commonly called a Modified Polar Mount or its more modern replacement, the horizon to horizon mount) and being equipped with a 'dish mover' (motorised actuator ram-arm) to move the dish east and west. Dishes also intending to receive inclined orbit satellites (such as Intelsat 510 at 180 degrees) must be further equipped with an 'elevation actuator arm' to adjust for the non-geostationary flight path of the older inclined orbit satellites.

With the arrival of Intelsat 701 at 174 east a dish 'stuck' on one satellite is at a considerable disadvantage. Video is showing up on 701 with increasing regularity (TR9/3876, TR22/4135, TR23/4166 and TR24/4188 MHZ) including many inward bound news feeds to Australia (example: 5:30PM weekdays, 4166, "Australian P.M. Pool Feed"), to Tahiti (example: Weekdays 3:30PM Paris "Antenne 2"), American sporting event coverage (basketball TR9/3876 when 'live' in USA). The good news is signal levels from 701 (on SWB/Southwest Beam) measure between 2 and 4 dB 'hotter', transponder for transponder, than their 510 counterparts; better pictures, smaller dishes. Pictures on the NWB (Northwest beam), favouring Southeast Asia, are on a par with pictures on Intelsat 510, transponders 9, 10 and 12. Although Intelsat 701 is primarily for telephone and data, with a transponder shortage on 510 it is increasingly being pressed into service for 'overflow' video traffic. 'Test programming' being fed to Australia, apparently as part of the hype-up leading to the arrival of cable TV there, is also appearing on 701 (as well as on 510 on Australian-9's transponder 22). Those without a dish that moves are missing out; a problem that will magnify when PAS-2 becomes operational by September.

digital format would be uplinked through OPTUS to cable, SMATV headends as well as to MDS (2 GHz terrestrial pay-TV) transmitters.

OPTUS does not have a 'secret South Pacific coverage ability' (CTD: 9311, p.20). Dr. Wayne Knowland, speaking to **CTD** for OPTUS, told us: *"It is true that on A3 we have a 3 transponder group that connects to a South Pacific beam. On the B-series we have only a New Zealand specific beam (beyond various Australian beams). There is no secret capability; I wish there was. I'd love to use it!"*

(Turner) TNT network (classic movies, live sports), Cartoon Channel, CNN International are to be carried by IndoVision, new Indonesian DBS operator. CNN International is already carried into Pacific by Intelsat (180 degrees), Cartoon Network and TNT are scheduled to be carried on PanAmSat (169 east) when it begins service later this year, might be carried prior to PAS-2 by Intelsat at 174 east as well (see special report on Australian cable TV this issue; page 20). NZ SKY Net CEO John Fellet told **CTD** he does not believe Turner's TNT or Cartoon Network will actually pass through Pacific on PanAmSat (on way to Indonesia, Australia); at least not initially. Fellet suggests Cartoon and TNT will go via tape to Hong Kong uplink, then be distributed to Indonesia on Apstar 1. Fellet adds that TNT sports (for example, heavy NBA/basketball coverage) is not licensed to TNT for outside of USA; TNT for Asia will be 'customised' to Asian audience. Turner's new Hong Kong regional office is suggesting that TNT and Cartoon Net will be combined into a single 24 hour channel for Asia (in English with Thai, Mandarin subtitles) and will not be available until last quarter of this year on Apstar-1. Whether Australian CTS (cable) can obtain US version of the two nets, or be forced to take new (customised for Asia) version is uncertain. Bottom line: speculation is plentiful, facts are scarce ... stay tuned. Turner is also negotiating for transponder space on Insat-2B, Indian owned national satellite, for a "cable/satellite network."

Murdoch's STAR TV satellite service, presently 5 channels into most of Southeast Asia via Asiasat 1, plans to expand directly into Indonesia. The present Asiasat 1 coverage for the fourth most populated country in the world is considered 'fringe' but the early 1995 launch of Asiasat-2 will place a 39 dBw footprint on C band over all of the country providing service to dishes under 1 metre in size. Murdoch appeared in Indonesia recently to promise, through the local media, his service to Indonesia. Unlike some Asian nations, home satellite dishes are not 'banned' by government authorities. STAR's music channel, MTV Asia, plans a split into two separate channels of service. MTV/Mandarin is to be aimed at Taiwan and China while MTV/Hindi would target India.

Rupert Murdoch has kicked BBC World Service TV out of his five channel STAR TV line-up for China, Taiwan, Korea and Hong Kong and on April 20th replaced it with Star TVs' first premium (pay) movie service. STAR hopes that by launching its movie service before HBO appears on new Apstar1 satellite (September-October) they will get

marketing edge on the HBO Singapore uplinked 24 hour per day package. BBC saw this move coming, but has not announced replacement satellite vehicle to continue serving these countries. It could contract for PAS-2, C or Ku-band service, but needs other programmers with it to make service more viable as a part of a 'viewing package.'

China's CCTV (national government operated TV service) will 'compete' with foreign satellite delivered programming by opening two new satellite delivered programme channels of their own; one for mainland produced films, the second for all-China sports. Target date for both is last quarter, this year. China passed law outlawing privately owned satellite dishes last October (see **CTD: 9312**, p.20).

UK satellite delivered Sky service 'piracy cards' price has dropped as forecast (see **CTD 9402**; p.33). Murdoch's BSkyB firm took Irish based 'smart card' firm selling 'counterfeit' cards all across Europe to court in Ireland ... and lost in late January. With newly won 'court approval' Magic Cards are being sold in London shoppes for as low as NZ\$110; before court 'victory' for 'piracy' firm, cards had averaged NZ\$250 upwards. Cards currently sell for approximately 2.5 times an 'average monthly Murdoch BSkyB subscription fee' and represent serious threat to this year's BSkyB profit structure since counterfeit cards after 2.5 month's use represent 'free service' to the user.

Then the dam burst. On April 20th the ultimate Videocrypt weapon exploded when everything about hacking the Videocrypt system was scheduled to go 'public domain.' Here's what that means. The Videocrypt system hackers, after watching the counterfeit smart card prices drop by 70% in 60 days decided to turn over all of the hacking information to the public. Simultaneously on more than two-dozen computer bulletin boards all over Europe (within hours, world-wide) the complete details for hacking Videocrypt would be released. In effect, what was previously secret and required a detailed 'hacking knowledge' to implement would become 'freely available' to anyone with access to a computer BBS; and with the speed of interconnecting computer BBS (systems), encircle the planet. Not only would this cripple the 'magic card' business in Europe, it would also do significant financial damage to Rupert Murdoch's BSkyB Videocrypt system. BSkyB losses in the current quarter could easily amount to tens of millions of dollars. For how this might affect New Zealand, see Terrestrial Broadcasting report at end of this section.

TVNZ switch to NTL MPEG-1+ format for transmission of BBC/ITN television feeds from London have been delayed; no explanation. TVNZ was planning February start, replacing analogue transmission of occasional programming with full-time transmission of 24 hour BBC 1 and 2 programming using digital service. In New Zealand members of the television programming industry have speculated that some BBC programmes, not scheduled for TVNZ use, might end up being broadcast by a TVNZ controlled 'regional television service' now in final planning stages.

Maspro, Japanese satellite hardware manufacturer, has created improvement in the way satellite dishes are 'coupled' to the low noise feed electronics system. '90 degree aperture' feed system allows LNB + feed to be pushed closer to the dish surface which in turn requires that dish surface be redesigned to move focal point 'in' on dish. Net result is everything gets smaller for comparative system sensitivity, and feed portion of antenna system moves 30 to 40% closer to antenna surface.

Canadian firm Tee-Comm, faced with competition from US DirecTv digital service, starting this month in five test markets, is putting together digital TV service using Ku band Canadian E-1 satellite. Canadian fear of DirecTv

"QUOTES", NOTES & ANECDOTES

Full appreciation of this report requires some background. In the US, the state of New Jersey is roughly comparable to Sarajevo with 'flash.' If you want to send someone to a place for their sins, Hoboken (New Jersey) would be a good choice. In New Jersey there are two intensely competitive chain stores that sell consumer electronics. One chain is called Tops Electronic City, another is called The Wiz.

Each Tops and Wiz store provides customers with a public washroom. In the men's rooms there are urinals for the usual purpose.

Tops has decorated the interior of its urinals, the area where users 'aim' their discharge, with the logo of its ace competitor 'The Wiz.' People 'whizzing' now 'aim' at The Wiz logo. Chain store The Wiz is not amused and has filed a 'trademark infringement suit' against Tops claiming that use of The Wiz logo inside of Tops urinals violates their trademark. In the suit The Wiz claimed "(use of the logo) was intended to denigrate, disparage, dilute and place in disrepute the famous, incontestable The Wiz mark."

Tops does not deny use of the logo in this unusual fashion and has offered to settle the suit by donating a settlement fee to a charity of The Wiz's choosing while steadfastly refusing to settle with a payment to the competitor directly.

PERSPECTIVE: What People Want From Cable TV

Nation-wide US survey of more than 15,000 homes has produced most detailed study to date of what Americans expect from their cable TV service, and how much they are willing to pay for each service. The results may not directly translate to New Zealand but they will have significant impact on the way the new '500 channel universe' is configured in the years ahead.

Those surveyed were asked to rate programming categories by indicating how much they were willing to pay for each service on a programme-channel basis, per month. The premise of the survey was that no services were automatically included in a home cable service; that homes selected specific channels (programme categories) from a large universe of available channels, and paid individually for those channels selected. Indirectly, this gave the survey takers information about the value viewers attach to various services.

Major networks (i.e., ABC, CBS, FOX, PBS and NBC): NBC would be a subscription choice by 75% of those surveyed, 74% for CBS, 72% for ABC, 65% for FOX and 54% for PBS.

Local News (whether through a local station on cable, or through a local cable company created channel): 59% said they would pay US\$1 per month for this service; 49% \$1.50, 12% \$3.00.

Cable-only networks: 57% were willing to pay extra for Discovery Channel (akin to having National Geographic magazine in television form), USA Network (movies, women's oriented programming, some sports) 56%, TNT (Turner Network Television; classic movies, live professional sports, family fare) 55%, CNN 52% and ESPN 44%. Highest ranking 'educational/instructional' network was The Learning Channel (at home degree-possible courses in science, humanities) placing 18th overall.

Future cable-only network 'concepts' that ranked well: (proposed) Game Show channel would be ordered by 25% of those surveyed; Golf Channel, on the other hand, drew a 9% response.

Rates: most surveyed were willing to pay up to (US)\$1 per month for channels they selected with only marginal drop in 'penetration between 50 cents per month per channel and \$1; sharp drops at \$1.50 per month for most channels. Full study available at US\$1,995 from Warren Publishing (001-202-782-9200).

"Deathstar" has reached fever pitch and Canadian firms believe they could lose access to Canadian consumers through American satellites. DirecTv service launch is underway as you read this.

Cable TV industry in US is reported behind planned competitor to DirecTv. Called Primestar, service has been operational for two years offering 14 channels of programming with medium power Ku band satellite to 1m size dish. Primestar plans to expand to 30 channels this month, 77 by end of year and switch to digital TV delivery in process. They have a reported 70,000 homes subscribing at this time. Also announced, two new DBS quality high power Ku band satellites similar in design to DirecTv birds offering 150 channels of digital video.

Australian Optus B-3 satellite, built by Hughes, has finally been cleared for export from US and launch by Chinese Long March rocket in perhaps July. Complications arose when Hughes designed satellite security system was denied export license. Hughes uses piracy-proof algorithm technique to prevent an unauthorised ground station from taking over control of a satellite in orbit. The system was developed in the 1986 era in response to the Captain Midnight incident during which a ground station operated by an individual using the signature of the comic book hero took over control of a satellite operated on behalf of cable programmer HBO and others. 'The Captain' overrode the HBO programming on the satellite and flashed messages to millions of American homes warning HBO to lower its rates or face retribution. This caused panic in American satellite industry; Hughes responded by creating sophisticated satellite security system relying upon advanced data encryption algorithms to ensure that future 'satellite hackers' could not 'pirate' an entire satellite away from its rightful operator. The security system was built into the Australian Optus B-3 bird as a feature the Australians apparently requested but Americans feared that while the satellite is in hands of the Chinese, during period of launch preparation, the Chinese might try to copy or defeat the system and in process break the Hughes 'code.' The solution that cleared the way for export of the satellite to China, on behalf of Australia, is to remove the security system. Australia lost Optus B-2 satellite during launch phase by Chinese and many proposed Australian uses of B series satellite programme have been delayed as its original A-series satellites now approach retirement date.

Saudi Arabia's 'second law' banning home satellite dishes (CTD 9403; p. 19) intent is now clearer. A firm calling itself ARA International has obtained an exclusive franchise to distribute pay television in the Kingdom using MMDS (2.1 GHz region) terrestrial transmitters. By banning satellite dishes, ARA International becomes sole supplier of 'alternate choice' pay-TV in country. ARA International is answerable to the government for 'programme content.'

Iran is latest middle eastern country to adopt law that bans private satellite dish ownership; cultural invasion given as reason. They are serious; within 60 days every privately owned dish owner must 'turn dish in to authorities' or risk imprisonment!

DIGITAL TV

Bad news for 1996 Olympics high definition television coverage hopefuls. US network NBC has stated it will not attempt to provide even limited HDTV coverage, citing projected shortage of HDTV cameras, production equipment 'ready in time for the Olympics.' The Atlanta, Georgia event was a likely spot to showcase the new technology but minor slippage in approval of various terrestrial transmitting aspects of HDTV have shortened time frame between expected final 'standard approvals' (now likely mid 1995) and Olympics (mid 1996) to point that not enough time will remain to build the significant amount of hardware required. US HDTV proponents are not giving up, forming special committee to attempt HDTV in 1996 without NBC support. If not, well, next stop is Sydney in 2000. Philips owned BTS has demonstrated new 4:3 or 16:9 solid state camera that operates in either format at flick of switch and said it could create HDTV version within six months of receiving firm orders.

Field tests of 'Grand Alliance' HDTV test system began March 31st in North Carolina. The initial testing phase is using static video test source allowing field strength measurements to be made over various types of terrain. More complex testing using full motion HDTV video should begin in June.

Multiformat video decoder chip has been announced by California firm C-Cube. Their new CL9100 chip will decode any of four different digital video formats including MPEG-2 in either simple or multiple profile, the General Instrument DigiCipher II format or the original MPEG-1. The new chip works with either PAL or NTSC video or several of the film conversion formats. Sample quantities will be available by May, larger quantities by September with a volume price of NZ\$63 for the CL9100 and its companion CL9110 transport layer demultiplexer chip. This is the package, and probably the price, that cable set top converger manufacturers as well as satellite receiver manufacturers have been waiting for. Once available, the cost of decoding virtually all forms of digital video will drop dramatically world-wide.

Real-time MPEG-1 encoding will be shipped to first clients at NZ\$171,000 by US firm Minerva Systems in June. Firm claims system is "*easily upscaleable to MPEG-2.*" Minerva has OEM agreement with Philips' affiliate Optimage, a firm creating CD-I software for Philips.

Digital VCR record and playback heads have been demonstrated in public by Japan's Alps Electric. Heads, designed for new 1/4"/6.35mm tape format, use 2-layer design with ferrite and new carbon steel compound. Testing of the heads is now underway by members of the Digital VCR Conference (see **CTD 9402**; p.6).

Basic technical specs for digital video broadcasting (over the air) in Europe have been approved by a Steering Committee of the Digital Video Broadcast Group. The next European step for adoption of the 'standard' is conversion of the standard into a source-book reference by the European Telecommunications Standards Institute (ETSI). The first regular broadcaster to home digital video services are expected to begin in Europe by the middle of 1995.

Mexican cable TV programming consortium is latest user for GI DigiCipher digital transmission system through Mexican national (Morales) satellite system. Four TV programme channels are now being distributed in digital format; 24 are planned by July and are available to all of Mexico, Caribbean, northern South American cable systems.

United States Department of Justice (DOJ) has confirmed it is investigating marketing arrangements established by General Instruments (GI) for its DigiCipher digital video system. Reports of investigation surfaced in January, played minor part in speculation during TCI-Bell Atlantic break-up with some suggestion that TCI's heavy support of GI DigiCipher made Bell-Atlantic 'uncomfortable,' report denied by TCI executives. Case centres around allegations that GI and TCI may have 'conspired' to establish DigiCipher digital video as a 'standard' to the exclusion of competitive systems from Scientific-Atlanta and others. TCI wields considerable market power and its decision to buy GI digital cable hardware during present TCI changeover to digital format led to charges. TCI apparently told digital video hardware suppliers they had to build hardware to GI specifications; a requirement that angered GI competitors since each would then be required to pay GI 'royalty' for units produced. GI and TCI both deny the allegations.

General Instruments has negotiated a license with Motorola to allow the latter to build and sell cable and satellite system hardware using the GI DigiCipher (digital TV) standard format.

Time-Warner (cable) has signed deal with Scientific Atlanta covering three year period for up to 1,000,000 of the SA series 8600X in-home set-top digital+analogue 'convergers.' The 8600 series units are a stepping stone to interactive TV services for cable customers and process either digital format or analogue format video as well as providing a platform that allows the cable subscriber to communicate through the unit's remote control with the cable company computers to order services.

COFDM - Coded Orthogonal Frequency Division Multiplexing, a method of transmitting HDTV and other digital TV formats already finding favour in UK and Sweden, will apparently be given serious consideration in US. National Association of Broadcasters, fresh from approval of basic HDTV digital format approval, know that backing the tests will delay final start up of HDTV in US by year or more; a tough decision given push to get system into operation at earliest possible date.

Raytheon (Semiconductor) is latest major firm to announce production of new IC device to process Zenith created 16-VSB digital cable transmission format signals. Raytheon plans to have IC units in 'volume production' by August. Demand for ICs has far outpaced available supplies; resolution of this bottleneck will speed up throughput of cable consumer home digital signal processing decoders.

Japanese Hi-Vision (analogue format) HDTV service now operating typically 8 hours per day; up from 6. Japanese NHK and Electronics Industry Association (EIAJ) are promoting 'damage control' after Posts and Telecommunications Ministry official in February suggested system would be shut down and replaced with all-digital format HDTV.

London's Carlton TV will use standby transmitter system at Croydon to begin digital television format broadcasting in 3rd or 4th quarter of this year. NTL will supply the equipment, possibly MPEG-2 format although present plans are to use MPEG-1+ since that equipment is already available. NTL recently completed a series of digital TV over-the-air tests in UK's west country on behalf of ITC.

Compression Labs, pioneer in the digital TV revolution, has introduced new second-generation MPEG-2 encoder/decoder units. Called 'Magnitude' line, products include modular design encoder and four different decoders. Professional format equipment is available 'for immediate delivery' in MPEG 1+; MPEG-2 format and consumer level products will be available in December.

CONSUMER ELECTRONICS

Flexible, flat-screen TV and computer displays capable of being wrapped around object or contoured against irregular wall could be result of a plastic that emits light and which therefore can be used in LCD displays. With present technology, polymers degrade with use and have half-life of under 400 hours. The technology holds the promise that future TV screens will contain no glass at all.

If TV screens without glass seems innovative, try on batteries containing no liquid (electrolyte) that are shaped and sized like the credit cards you carry, which can be bent, even cut on half, and still keep on performing. Bellcore, the Bell telephone company laboratory, has shown just such a 'Plastic Lithium Battery' package and it is now licensing commercial firms to bring the product to market, perhaps before the end of this year. You may believe batteries to be **(a)** low tech, and, **(b)** not very glamorous devices. Consider, however, where your cellular telephone, laptop computer or GMRS positioning receiver would be without efficient batteries. Now bring to market a battery that is a fraction the size of the current nickel cadmium (NiCd) units, weighs less than half as much, but delivers significantly better performance. Suddenly every device that uses (rechargeable) batteries becomes smaller and lighter as well. Bellcore's new (11 patents on technology) PLB is seen as a major breakthrough for everything that requires battery operating power.

Blue-laser technology, the 'missing link' to suddenly more than quadrupling of information capacity of 5" CDs, has had a break through. Pioneer claims it has perfected a practical blue laser which operates at room temperature although it cautions that commercial products using improved technology is "years away." CD information storage capacity, presently limited to approximately 74 minutes of digitally compressed video for example, crucially requires the ability to put more digital data onto a single side of a CD. Movie makers have repeatedly said they will not embrace video CDs until the CD can hold a full length movie (typically 115-120 minutes), preferably on a single side of a CD. Blue laser technology is the answer. By using a very highly refined 'laser beam' the density of the information can be packed tighter, 4 times tighter, than the existing red laser systems. Different laser light wavelengths have optimum densities that cannot be exceeded. With 0.78 micron red lasers, this limits the total density to around the 74 minutes of data point. An improved blue-green laser with 0.523 micron definition is 2.3 times better than a red laser but still not good enough for the demands of movies on CD. Sony announced in

September (see CTD: 9309, p.20) it had the blue-green laser nearing a point where it would begin to use the improved device for industrial grade equipment, but conceded that until the blue-laser was perfected, video CD was not a practical technology. This has not stopped Philips from bringing CD-I (with its video CD adapter) to market, but movie producers have been slow to take up CD-I / video CD because they are not happy with the requirement that movies use as a minimum 2 (and sometimes three) sides of separate disks. Pioneer's 425 nanometre break through uses a technique they call 'second harmonic generation (SHG)' which is quite different than the diode-direct engineering approach of others working on problem. SHG employs a 1920's radio technique updated to laser technology. A 850 nanometre 'long wave' laser signal is generated using conventional technology. This signal is then passed through a Du Pont developed product (crystallised phosphoric titanic kalium; KTPm for short) 'frequency doubler' that picks off the second harmonic of the 850 nanometre laser signal as a 425 nanometre blue laser signal voltage. It is a very neat trick but the real challenge was to make the system function unconditionally in a non-laboratory environment, such as when sitting on a shelf on a bookcase in your living room. Pioneer says they have this conquered using "*quasi-phase matching and an optical feedback system called distributed Bragg reflection.*" There is no test on this at the end; you have our permission to file everything but Pioneer's creativity away in a long forgotten memory buffer.

Rent-to-own industry in US has suffered another legal setback (see CTD 9403; p.26). State of Wisconsin court has ruled RTO transactions are subject to consumer laws which govern credit sales. US laws in many states set maximum interest, terms, of credit purchase contracts to protect consumers from usury interest rates. Many states also have rules forcing consumer credit sales companies to disclose, fully, the credit term price of all contracts versus cash sale price for same purchase. Thorn EMI Rent-A-Center in Wisconsin was object of suit and now rent-to-own customers will be supplied with same disclosure information as credit/time payment purchasers.

Profit for Philips world-wide operation in 1993 is turn around from 1992 loss of NZ\$871m although consumer electronics operations still lost money. Consumer division saw sales drop 2% in period which Philips blames on slips in Grundig owned firm which lost \$369m. Philips is placing major marketing effort in launch of Video CD-I and forecasts sales of 1,000,000 units in 1994.

Philips is entering 32"/813mm direct view TV screen market in US in response to increasing American demand for larger screen sizes. Firm is projecting 300,000 of the new tubes in next 12 months using screened face plates manufactured in Europe, wed to US manufactured 'funnels.' Firm also plans to begin manufacturing 16:9 (widescreen) TV picture tubes in US, probably in 26W"/660mm and 30W"/762mm formats initially.

New Zealand pricing for camcorder units versus US import price levels in 1993: New Zealand camcorders from Japan averaged \$1,224.96 each while Japanese camcorders imported to US averaged NZ\$959.14. Between 1992 and 1993, camcorders to US dropped 6.1% in landed price (some because of yen-dollar exchange variations) while in New Zealand 1992 to 1993 price change was in opposite direction (up in 1993) by 4.2%.

K-MART stores (US) has signed deal with Universal Electronics for new handheld 'universal' (operates almost anything electronic) remote units. All carry 'Philco' brand name in US, have NZ\$18 range street price. If after August new K-Mart 'universal remotes' appear at pricing significantly greater than \$20 here, you'll know that K-Mart pricing is not 'universal' world-wide.

Sony and US corporation Qualcomm have formed NZ\$94m venture to manufacture recently perfected Code Division Multiple Access (CDMA) cellular telephone units. CDMA is technology allowing bandwidths assigned to cellular to be used and reused such that channels assigned to cellular can carry between 10 and 20 times the number of simultaneous calls as non CDMA systems.

Sony has revised TV receiver and camcorder models and cut prices in apparent bid to revitalise sagging sales. Newest 32"/813mm direct view TV line begins with suggested retail price of NZ\$1800 with 20"/508mm starting at NZ\$539. Projection TV models include 46"/1168mm screen at \$4318 and 53"/1346mm at \$5100. In camcorders, Sony is moving to colour viewfinders and image stabilisation in majority of models. TR40 model offers colour viewfinder at NZ\$1438 while September release of TR80 will add Steady Shot at NZ\$1800. HandyCam 'Snap', introduced last September, has been price cut NZ\$360 to \$1440 in US.

Sony's switch to offshore production for its popular 19"/483mm size screens has begun, shipping 30,000 units this month from plant in Malaysia back to Japan. Set is an international package with CRTs manufactured in Singapore.

TV sets sold within US may be required to meet new 30% energy saving rule proposed by Department of Energy. The goal of DOE is to identify products in widespread use and target energy savings for each to reduce America's electrical grid strain. US, like other heavily industrialised nations, is facing new demands on energy suppliers and faces either massive increases in electrical energy generating capacity or cutback in heavy use categories. Under

proposed standards DOE estimates average TV set would have retail price hike of NZ\$34.87, save the average user NZ\$10.28 each year in energy charges, resulting in 3.5 year 'pay back.'

US consumer electronic sales off to record-setting year numbers after two full months (see New Zealand imports through end of February page 38 this issue). Year to date, TV/VCR combo units (not counted as a category by Statistics New Zealand) and projection TV sales up 30+ percent from 1993; VCR decks and camcorders up 3 to 4 %. Direct view TVs are down by 2.0% but net dollars in sales are up in USA. In January for first time ever since introduction of VCR, Japan was replaced in US market as number one supplier of videotape machines by Malaysia. Comparing January 1993 to January 1994, Japanese VCRs dropped 21.3% in quantity while Malaysia rose 34.1%.

US expects to end decades old restrictions on so-called high-tech electronic and computer equipment sales to Russia, China and other (formerly) adversary countries. Restrictions have placed US computer, software and satellite equipment suppliers at significant disadvantage in selling into these overseas markets while suppliers in other countries possessing same or similar technology have had free run at developing markets. China's announced plan to purchase NZ\$72B in communications equipment by year 2000 possibly had something to do with decision to end restrictions.

TV broadcasters attending annual NAB (National Association of Broadcasters) convention saw demonstration of 3-D TV which backers say could be in operation 'tomorrow.' System requires transmission of double the number of picture fields per second (120 in case of USA; 100 here) such that the images alternate and are flicker free when viewer wears CrystalEyes stereoscopic eye wear. TV sets to be 2D or 3D compatible would require either/or circuit to be added at time of manufacture, which demonstrators claimed "*would add a few dollars to the cost of average receiver.*" Broadcasters would also require additional equipment.

Japanese national economic study focusing on which of 1,008 firms analysed are in best 'management position' to cope with tremendous business changes underway found some of Japan's leading electronic companies may be on financially thin ice. Matsushita Electric was ranked 339 in financial strength, Sony 594th. Some that did well in ranking included Canon (#4), Kyocera (#8), Sega (#9) and Nintendo (#12).

Sharp credits their 'viewcam' line of cameras for recent sales successes in Japan. Company is now number three in Japanese national market only slightly behind Sony and Matsushita having passed up JVC in marketplace in January.

Korean Daewoo Electronics recorded 1993 sales gains of 16% with 19% profit growth; Samsung saw sales rise to NZ\$11.9B, a 32% growth while profits increased 113% to NZ\$214m. Daewoo has new VCR/security system that allows user to view security camera image (such as front door of house) in PIP (picture in picture) format, open door remotely using button on VCR remote control unit; visitors can also 'leave message' on VCR which records image and sound from those at front door for later review.

Goldstar, Korean manufacturer, has apparently settled patent dispute (**CTD 9309**; p.18) with US firm Go-Video, allowing shipment into US market of combination 8mm and VHS video package. GoldStar machine has 2 head 8MM playback deck and 4 head VHS play and record deck in single package. Suggested street price will be NZ\$1438.

3DO 32-bit interactive format that fits between games and computer terminal in pricing, has decided to create and market its own software. Firm had originally stated it would leave to licensees the software part; now says it will produce and distribute 3 to 4 separate software products each year under 'Studio 3DO' market label. Move is seen as effort to spur their more than 500 software licensees to speed up design and movement of products to marketplace. Approximately 40 software titles have been produced to date, less than 10% of the firms licensed to date.

SEGA has announced a marketing 'trick' which could end up confusing the forthcoming 32-bit game marketplace. Sega's Saturn CD-ROM system, thought to be on line for introduction in time for this year's Christmas market (see **CTD 9402**; p.13), is now apparently delayed. The cause of the confusion is a just-announced '32X add-on' for Genesis. Some background. Genesis is Sega's present money machine, selling 6 million units in 1993 and second only to Nintendo's 6.8 million unit delivery. Genesis apparently has a world-wide universe of 13 million plus units now in consumer hands. Saturn, a 32-bit faster machine, was going to be the next technology generation for Sega. Now confuse the market by announcing a 32-bit box that plugs into the 13 million universe of Genesis and price that box at NZ\$270. That's a serious competitive threat to the first 32-bit games now entering the marketplace (3DO at NZ\$900, Atari's Jaguar at NZ\$450, Philips CD-I presently at NZ\$720). The move has confused the competition who are asking, "*Why would Sega bring out an add-on that does 32-bit speed software at a price that is approximately 1/3rd of what it was expected their full 32-bit Saturn package would sell for? Isn't that the same as shooting yourself in the foot?*" Sega apparently doesn't think so and projects 2.5 million of the 32X add-ons will sell in the

first year (they expect to begin shipping in September). Of course any new game technology is only as good as its software and today there is none. Sega says, "Don't worry ... we will have 8 to 10 of the 32X games ready for the September debut." The product, to be known as 'Super 32X,' plugs into the Genesis cartridge slot and uses a pair of Hitachi SH2 RISC chips and a newly designed video processor. Sega claims this produces an arcade-like (high quality) display that includes texture mapping, high definition colour, fast processing speed, a constantly changing 3D perspective, software motion video and a host of other technical-jargon features that only a game designer would appreciate. Bottom line: the Super 32X at NZ\$270 will put new pressures on the New Zealand game market. In 1993, Sega managed a lopsided market domination by taking an estimated 90% of a business estimated at \$30m.

Atari posted 1993 financial year report: firm saw sales drop from NZ\$132.3m (1992) to NZ\$51.84m (1993). Recovery hopes are riding on recently released high speed Jaguar game system.

US Patent & Trademark Office, on reconsideration, has decided that all 41 patent claims in Compton NewsMedia search and retrieval system may be invalid. Compton has 60 days to appeal; patent revocation is not automatic.

US-wide 'interactive multimedia network' using combination of satellite links and fibre optics is goal of new agreement signed by National Amusement Network. Concept is that game players at amusement game centres would be able to 'sign on' interactive link and engage in game contest with other players located anywhere within USA (initially; world-wide expansion is later envisioned). They forecast 100,000 terminals 'on line' across US within 3 to 5 year time frame.

Super video and multimedia store chain Blockbuster (US) is test marketing standalone video game stores in 5 markets. The stores will sell plus rent videogame software. Blockbuster has been running very successful tests of CD-ROM rental at more than 50 San Francisco area stores and will roll out this new marketing niche at hundreds of other stores late this year.

CABLE/FIBRE TV

Greymouth's would-be cable operator Pacsat Westland is urging residents of the coast community not to support the voluntary funded TV3 translator organised by TV3 (see subsequent report, Terrestrial TV here). Stockholders Bernie and Winston Monk have used the Greymouth local newspaper to attack the TV3 plan which would link up a new channel 8 translator via the Hokitika TV3 translator commissioned in December (CTD: 9401, p.31). The brothers have warned Greymouth residents that "*the TV3 picture quality is poor* (in Hokitika)" and supporting its extension to Greymouth "*would be a mistake.*" The confrontation between Pacsat cable, affiliated with John Rutherford's Civic Enterprises Ltd, began in November when Rutherford sought financial assistance from NZOA to bring TV3 to the western coastal areas. NZOA delayed a decision through the summer holidays and during this period TV3 consultants worked out the plan to extend the Hokitika service northward to Greymouth. TV3 has been on record as opposing carriage of its signal by any New Zealand cable system (see CTD 9312; p. 35) although TV3 executives admit there is nothing in the (Copyright) Law (of 1962) that would allow them to stop a cable operator from carrying their programming. A TV3 executive told CTD, "*In my personal opinion, cable extends service at no cost to the broadcaster. But (company) policy is that cable growth (in New Zealand) should be stymied by every possible means.*" TV3 management from Canada has a 40 year history of battling the growth of cable there and watching their own 'local' audiences erode as Canadians have been given cable-imported programming choices not available on home antennas. Greymouth's cable was to have opened for business in December, then January. Now they say that TV3 service will be videotaped in Christchurch and brought to Greymouth daily "*with a slight delay*" and have re-announced their system will be operational by the end of April charging \$20 per month for four channels; TV1, TV2, TV3 on tape, and, CNN via satellite.

ESPN, carried extensively by SKY Network here and by cable elsewhere in world, has signed deal with Prodigy computer network system to allow Prodigy users to tap into constantly updated ESPN computer line sports scores and news service. Initial service is real-time update for wide variety of world sporting events; next upgrade will include live audio feeds of play by play events from around the world via Prodigy to be augmented by video on demand viewer controlled full motion shots of specific plays or sequences as requested by Prodigy user.

British cable TV marketplace continues unparalleled growth as value of 'uncabled, non-connected' homes in franchise areas rises again (see CTD: 9312, p.28). A newly approved cable franchise area, West Kent, has been auctioned with top bidder EuroBell paying NZ\$420 per household for 'the right to do business there;' a tenfold increase in just one year from previous auction prices. Getting a 'handle' on the real-world value of British cable franchises has become major 'institutional monopoly game' in UK as lenders and would be system owners debate

what a proper value for investment should actually be. Most financial models project a 45-55% cable penetration for British cable after ten years of growth in a region; and, suggest 30-40% of the homes will also subscribe to cable offered telephony services. A particular problem with present day British cable systems is 'churn,' the signing on, and getting off of cable subscription within the first year of service. Churn is averaging 35% per annum, more than twice that of America, ten times that of most European countries. British cable operators believe the churn will be much lower when programming offerings improve and are buoyed by indications that when a customer also subscribes to telephone service, churn rate drops to under 20%.

Europe's first digital format cable TV system is under construction by (German) Deutsche Bundespost Telekom and plans turn-on using MPEG standards in first quarter of 1995.

Japanese Ministry of Post & Telecommunications has invested NZ\$9m in 'core operating system' which 50 Japanese cable companies will draw from in expansion of industry to interactive cable services. Concept is that 'core system', linked to individual cable systems, provides sophisticated test bed for introduction of multimedia, interactive services. Initial services being offered include video on demand and interactive games. In related activity, Japanese consortium called General Magic, which is dedicated to bringing interactive multimedia to the marketplace, has two new members. Toshiba and Fujitsu have joined alliance that also includes US firms Apple, Motorola, AT&T and Europe's Philips. Japan's level of interest in the fast developing interactive multimedia marketplace has increased significantly during past 12 months but software 'language' differences remain a substantial problem for the export of Japanese software products outside of Japan. Fujitsu plans to build nation-wide communications network in Japan using General Magic as a platform; Toshiba, another participant, hopes to market hardware for the system in 1995.

Reflecting upturn in business investor interest in cable TV, (US) National Cable Television Association annual trade show / convention (New Orleans May 22-25) is up 26% on exhibit space sold, 30% on attendance pre-registration. BCL is sending representatives as part of its entry into cable field in New Zealand; SKY also sending personnel. 'On-line' pre-registrations available through Prodigy service.

Scientific-Atlanta, prestigious designer and manufacturer of cable and satellite hardware, continues to be subject of speculation concerning 'take over' or sale to none other than AT&T, the American telephone company 'mother' of all telephone companies. S-A has led cable's technology advances, first into satellite television distribution (1975), more recently into 750 MHz bandwidth cable systems (1992) and fibre optic networks (1993). AT&T would find S-A resources unbeatable and the telephone industry needs a strong cable-industry manufacturing arm as operating firms such as Bell-Atlantic enter the converging world of telephone and cable (TV). Locally, Telecom has purchased S-A equipment for its Auckland suburban fibre plus coaxial hybrid test network. Telecom competitor BCL has opted to purchase General Instruments/GI (Jerrold) brand hardware for their new Wellington suburb coaxial cable test system.

Microsoft and cable giant TCI are testing interactive cable services in Seattle and Denver using newly developed Microsoft software architecture.

Operating software developed by Silicon Graphics for Orlando, Florida test of full-network interactive home TV service is blamed for delay of test start-up until late this year. Time Warner cable firm says system will not begin important interactive testing (to 4,000 homes) until all of the software is completely ready. Silicon Graphics says they have as many as 100 software engineers working 'overtime' on the project which is seen as important evaluation of both interactive services and consumer acceptance of new technology.

Bell-Atlantic has established programme to aid and assist developers of interactive TV software for its new (this year) video dialtone interactive TV system trials. BA hopes that by encouraging software programming it will be able to bring to VDT services which are not presently available on any service. Bell Atlantic has also taken delivery of first Compression Labs MPEG-1+ format digital encoders for its (state of) Virginia video-on-demand trial scheduled to start mid-year.

TERRESTRIAL BROADCASTING

SKY Network TV CEO John Fellet told CTD on April 7th "*Although we are aware that piracy hackers have caused some problems in Europe to the Videocrypt Smartcard system which we share (in common) with European television programme sellers, this has not been a problem in New Zealand.*" What Fellet did not know at the time was that 13 days later everything about the Videocrypt encoding system known to the European 'hacking world' was scheduled to become 'public domain.' On April 20, a consortium of counterfeit card creators planned to release to more than 25 (computer) Bulletin Boards not only all of the details about 'hacking' Videocrypt, but they would also release a complete software programme allowing anyone with a PC to 'hack' the system inside of the

privacy of their home. Here's how it works in a thumb nail sketch. The user of a (SKY Network TV) Videocrypt decoder presently depends upon his paid subscription to SKY to authorise, through his smart card, his decoder. The smart card has subscriber-unique code addressing inside and when the card is inserted into the decoder box this unique address code is matched to a stream of authorisation codes imbedded inside of the SKY transmissions. When the card's numbers match the transmitted numbers (much like Lotto), the box 'decodes' the scrambled signals. If the subscriber has not paid his bill, his 'number match' is excluded from the SKY transmission stream (**This Card Is Blocked**) and the decoding function of the 'box' remains 'off'. Now along comes a 'public domain' computer programme that allows anyone with just a smattering of electronic knowledge, and a PC in their home, to substitute a card slot inserted replacement (uncomplicated) electronic circuit for the SKY card. Connected to the replacement-for-a-card is a flat cable that plugs into the serial port on a PC. Into the PC the SKY customer has placed a software programme originating through one of the 25 European computer BBS (Bulletin Board System) outlets. This 'public domain' programme running in the PC emulates what the hacked 'Smart Card' originally did; it allows the computer to sit there matching SKY transmitted numbers such that the customer's decoder always gets a 'match.' This tells the decoder that it is authorised to 'decode' the SKY signals, even when the user hasn't paid SKY a penny for the current month's service. In an April 6th telephone interview with **CTD** during his 'Beta Test' of the 'public domain' software scheduled for ultimate release on April 20, **Hack Watch News** (22 Viewmont, Waterford, Ireland) publisher John McCormac told us "*This may be the final nail in the Videocrypt coffin. From this point on, Videocrypt as a scrambling system is dead.*" McCormac, author of numerous highly regarded books on television scrambling systems and the acknowledged 'Guru' of television piracy techniques in the world, believes the intense competition between Videocrypt counterfeit card sellers led to this 'ultimate weapon' against the system (see pricing report in **Satellite News** report earlier in this section). Fellet could not be reached for reaction comment after the mid-April scheduled release of Videocrypt hacking on computer bulletin boards, as **CTD** was going to press. We did try to warn him to be prepared for a major breach in his Videocrypt security ... alas, once your 'secret' is 'public domain,' what's a fella to do?

VHF television channels, until now limited to ownership and operational control by TV1, TV2 and TV3, could be in for a small but important change (see **CTD** 9401; p.2). Staff of Ministry of Commerce has proposed to Minister Williamson that under carefully set out circumstances firms or individuals other than the 'big 3 VHF networks' be allowed to occupy and control VHF channels. What brought this matter to a head is a totally illegal 50 watt transmitter installed in the Timaru region of South Island by engineer Max Chapman. The translator picks up Christchurch CTV (UHF channel 48H) and rebroadcasts the channel on VHF channel 5. Why did Chapman do this? Pressure, it is reported, from local pubs that wanted the TAB racing (channel) service for their clients through CTV; but CTV does not reach the Timaru region, so TAB coverage is missing there. By locating a hilltop where CTV is available on channel 48, converting the signal to channel 5 and rebroadcasting it through a 50 watt transmitter, Chapman solved the technical (if not the legal) problem. Under most circumstances the transmitter would have been shut down by Radio Operations Group engineer-policemen. This one was not, pending a review of the current policy that restricts use of VHF channels to transmitters owned, operated by or on behalf of, or licensed to one of the 'big 3.' A decision from Williamson is expected shortly, possibly before this appears in print.

The **July 15** (1993) edition of **CTD** sister publication **TECH BULLETIN** assigned 35 pages to the subject of improving UHF television reception in rural areas. One of the solutions outlined involved installing a UHF receiving antenna on a hilltop where signals are strong, running the received signals through a standard (off-the-shelf) UHF masthead (antenna situated) signal amplifier, and then connecting the output of the amplifier (which normally connects through cable to one or more TV sets) to a second UHF (receiving type TV) antenna and 'squirting' the amplified, 'micro-power' signals through the air to homes up to a kilometre away (but down the hillside or in a valley where they cannot receive direct reception). Our reading of MOC rules suggested such an 'on-channel-booster' should be licence-able by MOC for not more than a \$54 annual fee. Between our July publication and this January the Ministry studiously avoided acting upon applications for licensing of just such devices, claiming first it was unsure of the format the application for a licence should take, later claiming it lacked the authority to do so. Early in March **CTD** publisher Cooper met with three representatives of the Ministry to hammer out details of a proposed technical solution to the problem. We can now report that the Ministry staff has sent to Minister Williamson a full proposal for 'On Channel Booster' (station) licensing that boils down to these basic elements:

#1) Licences will be granted on a 'multi frequency' basis where the applicant will specify which stations are to be received, amplified and 'rebroadcast'

#2) A power of up to 0.5 watts per signal transmitted will be allowed at the 'transmitter (amplifier)'

-SKY NETWORK NEW ZEALAND UPDATE-

SKY Network Television turned on the Hawkes Bay transmitters and had a 5% penetration the first day according to CEO John Fellet. SKY attributes this unusual situation to 'advance marketing' done through TVs 1-3 during the past few years and a high degree of customer anticipation. Home decoder systems were being installed by SKY contractors several weeks prior to the official turn on and for two months limited, low power SKY service had been available in some portions of Hawkes Bay.

SKY next plans to turn on their Palmerston North transmission site April 27; a 'Home Show' sign-up booth there attracted 1,200 'advance' customers over 3 days early in April. Invercargill is scheduled for (late) May, Dunedin in June and Wanganui in July. Next? An off-air fed trio of transmitters for Whangarei is under serious consideration but no decision yet. What about the fourth channel? The previously announced July start-date, to use off-times for TAB transmitters nation-wide, has been rescheduled to at least September. The (4th Channel) final mix of programming is also not firm but children's television, music television and natural history programming in 'blocks' remains under study. SKY had 135,102 paid subscriber equivalents on April 7; up from 125,553 on 18 January.

#3) Licences will be for a period of five (5) years

#4) Applicants will be required to obtain, in writing, the permission of the stations to be 'boosted' prior to the submission of applications

#5) Based upon a projection that the processing of such licences will require 1 to 2 hours of MOC staff time, the licence fee would be set far lower than all present fees (the exact fees to be charged have not been determined)

#6) All such 'On Channel Boosters' will be required to resolve on their own any interference they might cause to individuals who are receiving the same signals 'directly' (i.e., not through the booster).

#7) On channel boosters would receive no protection from interference to their transmissions.

The exact 'hardware' that will be allowable for this service will depend upon the final format of the rules to be developed. CTD will provide a complete set of guidelines for both licensing and on-channel booster system design after the proposal has the approval of Minister Williamson, and, the Ministry staff has written the required rule changes that will allow this service to proceed. The matter was spotlighted in CTD for January 1994 (see pages 2, 5 and 18).

51-53 MHz 'problems', between New Zealand ham radio operators and Ministry of Commerce (see CTD 9311; p.34) received airing 12 March at annual joint meeting of amateur group (NZART) and two representatives from MOC. Amateurs fear loss of 51-53 MHz operating privileges when new VHF Management Rights scheme comes on line later this year. Ministry discounted amateur position that TV channel 1 NICAM signal, which falls outside of channel 1 and within amateur assignment, is a 'problem' because as MOC representative put it *"There is an allowance (in the technical rules) for spurious emissions (falling) outside of the normal channel (and) this out-of-channel energy is technically defined as being a part of an 'emission mask.' The extra NICAM subcarrier,"*

-FEBRUARY 1994/YEAR TO DATE CONSUMER ELECTRONIC IMPORTS-

	FEB IMPORTS	YEAR TO DATE	1993 AVG COST	FEB AVG COST	JAN AVG COST	% of 1993 Thru Feb.
CD PLAYERS	2,984	4,547	<u>\$261.31</u>	\$328.10	\$305.43	11.3%
VCRs	10,199	13,276	\$478.82	<u>\$392.01</u>	\$408.55	12.4%
CAM- CORDERS	1,504	3,037	\$1,224.96	<u>\$1,132.38</u>	\$1,091.80	13.2%
COLOUR TVs	21,924	38,143	\$514.58	<u>\$406.28</u>	\$403.36	<u>18.7%</u>

said MOC "does not alter the emission mask to any great degree." The technical accuracy of that statement aside, a core group made up of heavy users of the so-called 'Six Metre Band' believe they may still be forced into court with MOC unless the Ministry can work out a way for amateurs to retain the assignment as well as spot operating privileges in the 50-51 MHz segment when used outside of normal TV channel 1 coverage areas.

New Zealand's newest television station, "Kaitaia College TV", began testing on channel 41 April 23. The campus-coverage TV station, using a 1/2 watt transmitter put together by Kevin Dawkins at Signal Master (09-525-5599), will make it possible for the school's AV department to produce community programming for delivery directly into classrooms on the widely scattered campus. The school studied running coaxial cable, found that for 1/3rd the projected costs of cable they could obtain a licence and equipment to broadcast directly to rooms.

And, New Zealand's newest FM 'broadcasting station' is now broadcasting at Pakuranga College (Auckland). This college pioneered "campus television" more than one year ago, now has added 300 milliwatt (3/10th watt) FM broadcast service. VEXX Digital FM Limited (09-473-1818) supplied the transmitter (see **CTD: 9309**, p. 23) which AV head Gordon Lawrence reports is being used as a "College Electronic Billboard" to announce events of interest to students and faculty. Lawrence believes this is the first educational centre to adopt this new licence-free broadcasting service and "*the coverage far exceeds our expectations*" with reception out to 5km plus from the 100.4 MHz transmitter. VEXX obtained Ministry of Commerce approval for the licence-free transmitter 14 months ago.

Revised RFS-29 rules governing low power, unlicensed transmitters has finally been released. MOC in November was studying plan to create new 'Talking Billboard' radio service built around 300 milliwatt level transmitters. Revised rules now available ignore this concept, reduce power limits for 'radio microphones' to 100 milliwatts. However, VEXX unit at 300 milliwatts is 'grandfathered' which is fortunate for supplier since only other approved unit at that power level is an Australian import used exclusively by Tourist FM. VEXX has signed a deal to install a pair of units in Hamilton for real estate agency; they will be used to promote 'open house' events and notify real estate buyers of new listings.

TV3 apparently has sanctioned 'fund raising effort' by community of Greymouth on west coast of South Island. Following successful fund raising by Hokitika residents last spring (**CTD 9401**; p.34) which created 5 watt channel 11 unit to relay TV3 via knife-edge refraction path out of Christchurch, Greymouth has been assured TV3 will approve a channel 8 unit for community. This one will take feed from channel 11 Hokitika which will be 'allowed' to up power to 25 watt region along with repositioning of transmit antennas to improve service northward along coast towards Greymouth. TV3 engineering consultant Phil Johnston (JDA Associates) is scheduled in Greymouth around end of this month to inspect how project is progressing.

BCL planning a 2 metre size Ku band satellite dish at an Auckland area site to take approximately 2 hours per week from Australian Optus satellite for use by a New Zealand television network. No ... not that network.

Digital Audio Broadcasting (DAB) tests are underway in Canberra under the auspices of the Department of Communications and the Arts (DoCa). The test system is evaluating CD-quality digital audio transmissions from a 1452 MHz 'L-band' (1.452 GHz) 1 kilowatt transmitter supplied by Rohde & Swartz. The Australian Broadcasting Authority is comparing simultaneous reception through an existing band II FM broadcast facility and the digital format transmissions. The frequency range chosen for the tests would be a poor choice for actual broadcaster-to-home or automobile coverage should Australia adopt DAB in the future.

Australia has closed down another channel 0 / band I TV transmitter after activating a UHF / band IV transmitter as a replacement at Wynyard in Tasmania. Australia is systematically replacing band I transmitters with UHF to resolve interference problems created by power lines and other noise sources which degrade band I reception.

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